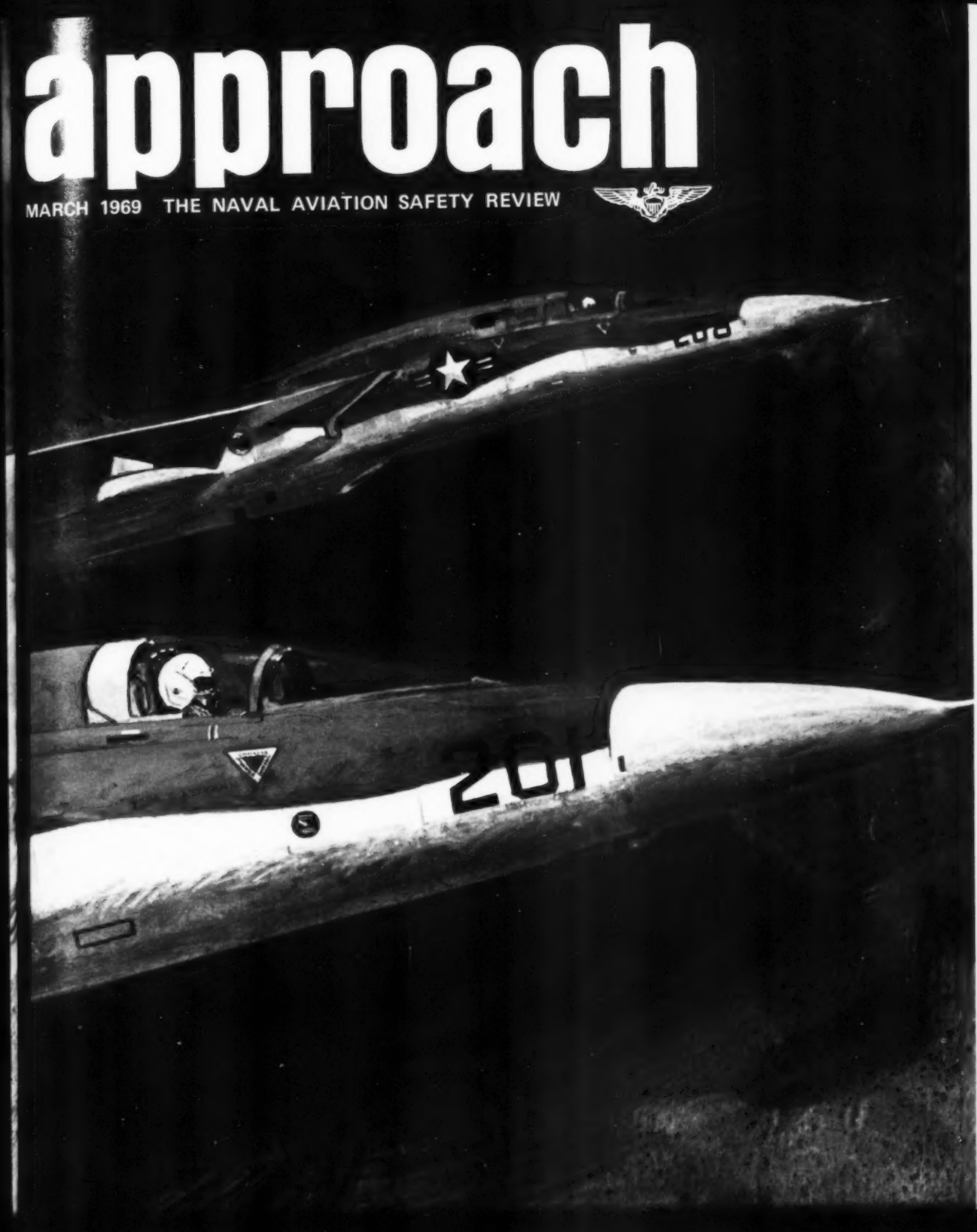
approach

MARCH 1969 THE NAVAL AVIATION SAFETY REVIEW



The global, all-Navy mission of the Naval Safety Center is depicted by the Naval Safety Center insigne, recently approved by CNO. It is reproduced here as a symbol of the renewed emphasis on naval aviation safety advocated in this issue of APPROACH.

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RATE PER 10,000 HOURS

Because of the rising accident rate, aviation commanders have sounded the call for

GENERAL QUARTERS!

THE all-Navy major aircraft accident rate has taken a turn for the worse. This first became evident in FY-66 when the rate *increased* for the first time since FY-51.

FY-66's rate of 1.27 was a modest increase over the FY-65 rate of 1.25, to be sure; however, later events have shown this to be only the beginning of a serious digression from the downward trend. The rate rose to 1.37 in FY-67 and to 1.41 in FY-68. Moreover, the latest figures available show an estimated rate of 1.39 for *calendar year* 1969. So, anyway you look at it, *the rate is up.* (Refer to the accompanying chart.)

About This Trend

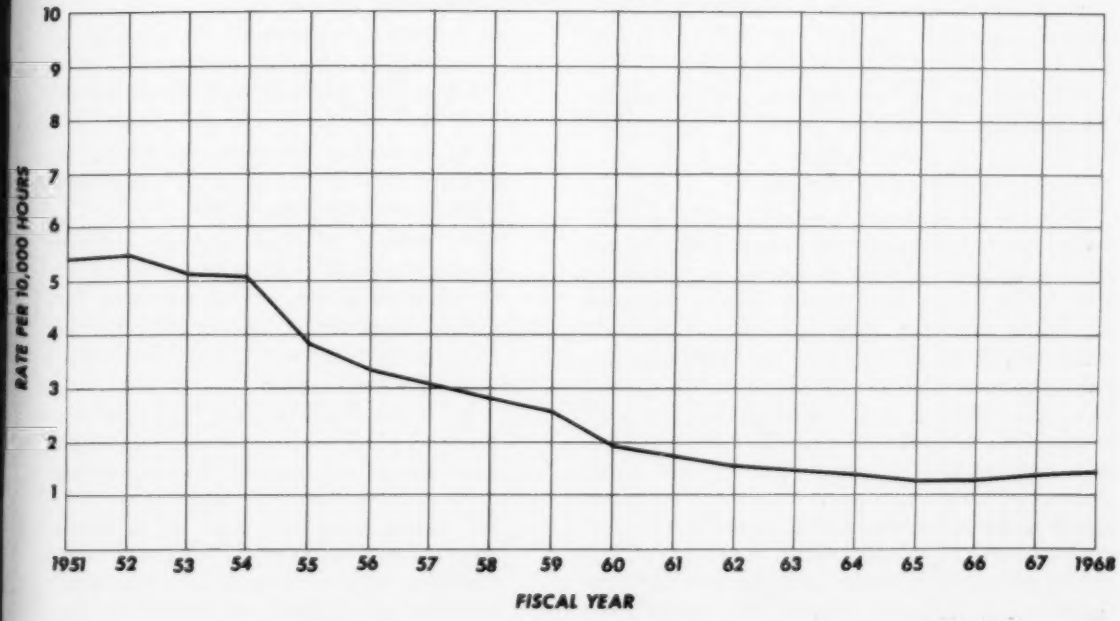
Does the trend in the rising aircraft accident rate call for an agonizing reappraisal of our *safety programs?* An excerpt from a recent ComSixFlt message may help answer this question:

"... In reviewing these examples (of recent accidents), in addition to various summaries Navy-wide, it appears that we are either paying lip service to safety programs or are losing sight of the forest for the trees. We know that accident prevention requires constant attention and is based on a sound safety program. We also know that the safety program is based upon the rigid application of basic procedures established by cumulative years of experience. This is the heart of the matter, not how well a program looks on paper ...."

A *safety program* is only one side of the coin of naval aviation safety. The other side is the *application* of the program. As to any agonizing reappraisal of our safety programs, it may be that, on balance, we are long on

ALL NAVY AIRCRAFT ACCIDENT RATE

FISCAL YEAR 1951-1968 Rates per 10,000 Hours



programs and somewhat short on their application. For example:

A Look at Our Annual Back-in-the-Saddle Program

Almost every year the aircraft accident rate takes an upturn following the Christmas holidays. This fact has long been recognized and increasing efforts have been made in recent years to eliminate this seasonal upturn. The effect of the programs embodying these efforts is uncertain. No one can say what the magnitude of the seasonal upturns might have been if these special efforts had not been made. It may be that these efforts were effective in preventing seasonal upturns of disastrous proportions . . . but that's mostly conjecture.

What is known with certainty is that, although there have been some notable successes with the program – overall, we have not succeeded in preventing these seasonal upturns in the all-Navy aircraft accident rate. Apropos the January 1969 back-in-the-saddle effort, the following headline appeared in the *"Weekly Summary"* dtd 5-11 Jan 1969:

> "During the first 11 days of January there were 12 alfa accidents, 13 aircraft destroyed and 10 fatalities."

In view of this, it is fair to ask some questions about this recent effort:

- Was the back-in-the-saddle effort timely? Was the planning commenced far enough in advance of its execution?
- Was it a substantial program of serious intent with concrete application to unit personnel and their operations – or was it all on paper?
- Was the necessity and desirability of the program understood and supported at all levels?

Safety Programs Versus Application

Today it can confidently be stated that there are very few individuals in naval aviation who are unaware of our safety programs or who are against the idea of safety. Nevertheless, it does seem that not enough individuals are making the ideal connection between the idea exemplified by the safety program and its application to daily operations. This is borne out by statistics which show that, although many accidents have occurred because of material failure/malfunction, weather, etc. – and continue to occur – human error is the predominant cause factor in more than half of all major aircraft accidents. For example, pilot factor was involved in 40.6 percent of all major aircraft accidents in FY-67 and in 44 percent of those occurring in FY-68. The significance of accidents caused by other factors should not be minimized, nor should efforts to correct these deficiencies be relaxed; however, personnel cause factors seem to be the most fertile field for early improvement in naval aviation safety.

A Call to Arms

Aviation commanders throughout the Navy are expressing concern at recent trends. They are, in effect, sounding the alarm and issuing a call to arms. Here are some quotes, selected as being typical of their comments:

- " . . . therefore, each responsible commander (should) take a new hard look at his safety program and that of his subordinates . . ."
- " . . . Each mission and its requirements should be evaluated. Launch each aircraft only after carefully considering the readiness of the aircraft and its crew to adequately perform that mission . . ."
- "The tragedy of past accidents need not be repeated in 1969 if hard work, careful planning and good judgment is exercised at all levels of command."
- " . . . There can be no substitute for professionalism and attention to detail on the part of all personnel."
- "Advance technology has increased the complexity of day-to-day flight operations. The rigid requirements of planning, conduct, inspection and analysis of each evolution that demand our utmost attention may cause, at the same time, a tendency to lose sight of lessons previously learned as a result of past aircraft accidents."
- "Carelessness and complacency can be overcome only so long as unremitting pressure is effectively applied against them."
- "Analysis of (fatal) accidents indicates varying degrees of weakness in supervision and air discipline in one-third of the total. This upward trend can be reversed only through dynamic, comprehensive and professional supervision at all levels."
- "It should not be taken for granted that the performance of people, normally assessed as above average, will necessarily be above average on all occasions. Relaxation in performance can be subconscious as well as conscious. Supervisors, as well as others, are subject to this possibility. What can be done about this frailty? Selection and designation of quality assurance

inspectors must be based on sound criteria generated by and continuously reviewed by the command."

- "... If the major accident rate for the first 2 weeks (of 1969) were to continue, (naval) aviation would suffer irreparable loss of men and material."
- "Above all, let there be no doubt in anyone's mind that safety is fundamental, repeat, fundamental in the planning and execution of all flight and maintenance evolutions."

Applying Our Safety Programs

An improvement in naval aviation safety can only be brought about by the same forces that accomplish all other tasks in the Navy – the men and their supervisors in the chain of command. It is, above all else, *an all-hands responsibility.*

How can our safety programs be applied so as to personally involve every man in their successful execution? The answer is most difficult but we can generalize by saying that there seems to be no better way than to put out the word and set a good example.

Continued

A Review of NavSafeCen Periodicals

- ***"The Weekly Summary."*** This is a pamphlet which provides a summary of aircraft accidents occurring during the preceding week; a statistical summary of accident data; and a brief discussion which highlights current problem areas.
- APPROACH. This is a monthly magazine devoted to a general review of naval aviation safety. It is directed at everyone in naval aviation. Although most of the articles in this magazine do get to the heart of the subject, quoting details, meticulously identifying equipment, procedures, publications and quoting statistics, the need for stimulating reader interest is recognized – and catered to. These articles are written to illustrate or highlight *problem areas which have become apparent through an analysis of reports from the Fleet* – where the action is! If you enjoy the articles, we are pleased... but don't overlook the important messages!
- ***"Crossfeed."*** This is a monthly publication issued in two parts. It is sectionalized with sections on NATOPS, maintenance, facilities, survival, etc. It also contains sections which deal with specific series of aircraft or groups of aircraft with the same mission. For example, if you are an A-4 pilot, you will find a section pertaining to A-4 aircraft, written by an operations analyst who has had extensive, recent Fleet experience in that series aircraft. All sections of ***"Crossfeed"*** are, in fact, written by individuals with extensive experience in the areas concerned.
- ***"Mech."*** This is a quarterly magazine which presents information on maintenance-caused mishaps, their prevention and general aviation ground safety. This magazine was formerly published annually and some potential readers may not be aware that it is now issued on a quartely basis. Pass the word!
- ***"U.S. Navy/Marine Corps Aviation Accident Statistical Summary."*** This summary is issued in two editions, one on a calendar year basis and the other on a fiscal year basis. It provides statistics on all naval aviation operations. As such, it is classified, however, this publication contains information of potential value to every man in naval aviation. As indicated in the promulgating letter, commanding officers are authorized to extract certain portions of this material for wider dissemination. An effort should be made to get this important information to authorized personnel who have a need to know – and can put the information to use.
- ***"Flight Surgeon's Newsletter."*** This publication is issued quarterly. It is concerned with the aeromedical aspects of naval aviation and is directed primarily to commanding officers, aerospace physiologists and psychologists and to Navy flight surgeons.

Putting Out the Word

The *word* comes in many packages – NATOPS, Navy training courses, lectures by experienced personnel, maintenance instruction manuals –and many others too numerous to mention. But, whatever package it comes in, putting out the word is a responsibility inherent in the role of supervision.

We regard NavSafeCen publications as one important source of the word. Although the NavSafeCen endeavors to support safety through the promotion of professionalism, a large part of its stock in trade are the exceptions to professionalism – and safety. Every time an exception occurs the NavSafeCen collects the facts, subjects them to thorough study and disseminates conclusions and recommendations to appropriate commanders. Equally important, the gist of this information is fed back to the Fleet in periodicals, posters, special studies, etc., in order that all may learn to avoid many of the situations and practices which lead to the exceptions.

It is entirely possible that some of the periodicals referred to are not as well-known or as widely consulted as we like to believe. Nevertheless, these periodicals portray the state of naval aviation safety in a factual manner and can be of valuable assistance to all hands in the quest for increased safety. We, therefore, offer a short review of these publications (see the accompanying box on page 3.)

Setting an Example

A great deal has already been written on the importance of setting a good example. We can't hope to add much to this except to suggest that many individuals may be unaware of the fact that they are looked to by others as an example. What a line supervisor does in the way of example is extremely important, of course, but what may not be so apparent is the fact that all of us serve as an example – good or bad – for our contemporaries. Resolve to make it a good example.

In the long run, a good example will equal 10,000 admonitions!

Summary

The overall major accident rate is on the upgrade. We may be placing excessive reliance on programs instead of their application. Many of our senior commanders have sounded the alarm. *The rest is up to all hands.*

MAN YOUR STATIONS!

By Major J. L. Pipa, USMC
Helicopter Analyst
Naval Safety Center

FLYBOY Interview: Hairy Helo

HERE is an intimate, revealing in-depth interview with Mr. Hairy Helo, noted rotary wing pioneer and lecherous old man-about-town, conducted by Mr. Huge Hefter, the dynamic president of Teeny Weeny Airlines, Inc. Mr. Hefter has examined, in detail, the collective thoughts and comments of Mr. Helo in a startling and provocative discussion presented here on these pages. Following a recent European sojourn, to study the physiological effects of prune Danish in the space capsule environment, Mr. Helo offers this bit of wisdom for us to consider; that "The acid test of a person's character is what he does in his spare time." Among today's rapidly changing values, and frequent personal ups and downs, we would do well to consider whither we goest in the rotor head business. And, Mr. Helo gives us a rather unique insight into his world of constant values such as Wart's law, which states in part, the principle that "An autorotation to a 2 G landing is better than a sharp stick in the ear." Let us now explore Mr. Helo's domain of the rotor-craft in this scintillating interview of a man considered by many to be the master link in the lengthening chain of successful helicopter development.

Mr. Hefter: Mr. Helo, what is the state of helicopter aviation today?

Mr. Helo: When I first got into this business of rotary wing aviation many years ago I was told that, at that time, it was approximately equivalent to the *Spad* era of fixed wing aviation. We had simple, unsophisticated machines with almost negligible avionic and hydraulic systems and little instrumentation. They weren't certified for instrument flight and much of the flying was done by "seat of the pants" feel, engine and transmission sound, and vibrations on the soles of the feet from the rudder pedals. Little was known by pilots about the aerodynamic effects of translational lift, transverse flow effect, settling with power, retreating blade stall, etc., etc., etc.

Today, I think we have progressed to an era roughly equivalent to the straight wing era of fixed wing jet aviation, circa *Banshee,* F9F-2, F-80 and F-84. A giant step forward has been taken with the introduction of the turbine-powered rotary wing family. We have multi-million dollar machines with highly sophisticated electronic/hydraulic systems, trim tabs, SAS, ASE, AFCS, Nr, Nf, Ng, cadillac units, semi-articulated heads, articulated heads, rigid rotors, synchopters, V/STOLS and a whole new language of technical terms.

The modern helicopter pilot receives intensive instruction in all

Few of us are as good as we think we are. If we were, there would be very few accidents and no need for safety officers, multi-engines or redundant systems. Not even Snoopy is good enough to defy the laws of physics.

When asked for a qualitative analysis of the skill of a pilot involved in an accident, most supervisors tell my ASO, "He was one of our best," or "An excellent pilot," or "Exceptionally well qualified."

No safety program can be effective without the complete and wholehearted support of responsible personnel who are in position to influence large numbers of people.

phases of rotary wing aerodynamics and has any number of reference publications to assist him in computing density altitude, hover in ground effect, hover out of ground effect, max allowable gross weight, max endurance, max range, etc.. He even flies IFR now.

Mr. Hefter: In view of all the advances you mentioned, Mr. Helo, has anything remained static in the rotary wing world?

Mr. Helo: Very definitely, Mr. Hefter. Lift and thrust still must exceed weight and drag in order to become airborne or maintain flight. The engine still must turn the rotor system at a speed great enough to produce the desired lift/drag ratio. Thin air still produces less lift than more dense air. It still requires a shade more power to take off than it does to hover. It requires more power to hover out of ground effect than in ground effect. The advancement in technology has not changed these basic principles one iota. Another thing which remains the same are the accidents, which cost us dearly in terms of lives, machines and money. Helicopters are still sustaining damage due to sudden stoppage (impact with the ground during a high rate of descent), just as we did back in year ONE.

Mr. Hefter: Are you implying, then, that the men who man these machines today are not as skillful or talented as those who manned them 20 years ago? That would seem to be a logical conclusion, since they are flying better built, safer machines but are still crunching them for the same old reasons, even though they receive better training.

Mr. Helo: Not at all, Mr. Hefter. The current crop of pilots is infinitely better qualified than we were. Unfortunately, they seem to have short memories and, good as they are, they aren't quite as good as they *think* they are.

Mr. Hefter: Would you explain that last statement please, Mr. Helo.

Mr. Helo: Of course, It appears that after a few successful years as a helicopter pilot, these pilots tend to forget the basic rules of good, safe operating procedures which someone went to a great deal of trouble and expense to indoctrinate them with in the beginning. I choose to believe this rather than think that they would knowingly and flagrantly disregard these procedures, thus jeopardizing the lives of the many passengers which we transport today. This would be tantamount to murder.

Few of us are as good as we think we are. If we were, there would be very few accidents and no need for safety officers, multi-engines or redundant systems. In any event, no one, not even Charles DeGaulle, Snoopy, Tiny Tim (bless his heart) or the Playmate of the Month is good enough to defy the laws of physics, although I'm occasionally unsure about the Playmate. Pilots keep trying and they keep busting up aircraft.

No group, anywhere, in any field, can be 90 percent above average when they are competing among themselves, because everything is relative. The vast majority of any one group must be average, with the remainders being above and below average.

Mr. Hefter: Who are "they," Mr. Helo?

Mr. Helo: Funny you should ask that question, Mr. Hefter. Do you realize that, when asked for a qualitative analysis of the skill of a pilot involved in an accident, most supervisors tell my safety engineer, "he was one of our best," or "an excellent pilot," or "exceptionally well qualified." I have come to the conclusion, Mr. Hefter, that above average and excellent pilots have 90 percent of the accidents. If this is true, doesn't it logically follow that, by eliminating the above average pilots, we can reduce our accident potential by 90 percent?

Mr. Hefter: Obviously, there must be a fallacy somewhere in that line of thinking.

Mr. Helo: Of course there is, and that fallacy lies in the supervisors' estimate of the individual's talents. No group, anywhere, in any field, can be 90 percent above average when they are competing among themselves, because everything is relative. The vast majority of any one group must be average, with the remaining percentages being above average and below average. Our supervisors seem to have lost their sense of proportion and developed a distorted set of values.

Mr. Hefter: You have expounded quite eloquently upon the shortcomings of our present system. Do you have any solutions to offer?

Mr. Helo: Yes, I have. Don't neglect the training (book-type and theory) of the junior birdman once you pin on those wings and launch him into the blue. Refresh his mind periodically through written tests (short and informal), professional publications and constant repetition. The most important man in the system, however, is the supervisor. A safety program will be only as good as the support given it

by supervisors throughout the complete spectrum of management. The aviation industry, in attempting to reduce the staggering loss of men and machines through accidents, has emphasized almost every conceivable aspect of aviation safety in the past. This effort has resulted in the NATOPS program, quality assurance, redundant systems, better training, periodic rechecks, physical and mental qualifications, flight surgeons, flight equipment, etc., etc., etc., ad infinitum. In spite of the programs, we continue to waste irreplaceable assets in preventable accidents. The last remaining bastion which has yet to be breached for its proper contribution to the aviation safety effort is that very personal, intimate and important factor of supervision or, if you will, leadership. No safety program, aviation or otherwise, can be effective without the complete and wholehearted support of responsible personnel who are in a position to influence the attitudes and actions of large numbers of people. And I don't mean lip service either. There is already too much of that (especially at the staff level). These leaders must be truly and sincerely convinced that the best way to accomplish a mission is also, more often than not, the safest way. Then they, in turn, will be better able to pass on this attitude to the personnel who fly, maintain and service the aircraft. I am firmly convinced that until the onus is put on leaders and supervisors at all levels, we will continue to suffer this abominable depletion of human and mechanical resources.

Mr. Hefter: Thank you, Mr. Helo!

AIR BREAKS

Hung Starter

Preparing for a midmorning flight, the No. 2 engine of a P-3A was started in normal RPM. The bleed air manifold pressure was checked and a rise was noted when the starter button popped out. The flight engineer called a normal start and ground electrical power and air were disconnected.

The No. 1 engine was started next. With two engines running smoothly the No. 3 engine starter was then engaged. At about 50 percent RPM the crew heard a loud bang and felt a sharp jolt. The PPC, who was occupying the right seat, called, "Feather three," and the flight engineer complied immediately. As the prop blades went to feather the pilot in the left seat called, "Fire on two."

The PPC noted 1180 TIT and a Bingo light and called, "Feather two." The flight engineer pulled the E handle and pressed the high rate discharge button for the fire extinguisher but the pilot reported that still nothing had happened. The flight engineer fired the alternate HRD and the pilot then quickly called for the crew to abandon the aircraft.

Following shutdown of the No. 2 engine, no electrical power was available to the aircraft so the HRD bottles did not fire, the flaps could not be lowered and no radio transmissions to the tower could be attempted. Fortunately another squadron aircraft was parked nearby and the PPC, who had observed the explosion, notified the tower and called for fire trucks.

All five crewmembers exited the aircraft via the starboard hatch and there were no injuries to the crew or to any of the line personnel.

As soon as the No. 2 prop stopped rotating an alert lineman grabbed a fire bottle and discharged it into the engine. Several other linemen were in the vicinity and with their assistance, eight or nine more fire bottles were directed into the flames. These retarded the fire somewhat, but did not extinguish it. The crash truck subsequently arrived and extinguished the fire completely.

Investigation revealed that the cause of the explosion in the No. 2 engine was the starter control valve, which had stuck almost completely open. Excessive air pressure which this allowed then caused the starter to disintegrate. The engine had over 2600 hours on it and had no record of any starter problems.

This incident once again brings up the problem that no positive indication of starter disengagement is available to the crew of a P-3 on the first engine started. The only check has been the air pressure rise on the bleed air gage as it returns to its before-start-pressure but this can only be observed for a fraction of a second as the engine accelerates. The second, third and fourth engines started give a much better indication since the air pressure rise can be observed in Low RPM and a 40 to 50^0 drop in TIT will be observed when the starter valve closes.

The problem has been taken under consideration by NavAirSysCom along with the reporting squadron's recommendation to install warning lights in the cockpit to indicate when the starter control valve is open. ◄

GOING HOME

INFREQUENTLY enough, a pilot filing a flight plan, Dallas to Norfolk, finds VFR conditions all the way. This story is not an exception. It was VFR at both ends but a weak front lay in between. The forecast called for a 70 kt tailwind at altitude and cloud tops about 20,000 ft. This would be easy.

A regular, thorough preflight of the A-4B was made. All was OK. The pilot strapped in and got a good start. However after lightoff he got an *abnormally heavy oxygen flow* through his mask. The high pressure would not allow normal breathing. It seemed to be caused by a stuck valve in the mask. After reseating the inhalation valves or "something" the system returned to normal flow.

The pilot received his clearance and took off. He noted while climbing through 5000 ft that his *RMI started spinning.* "I contacted Fort Worth Departure

Cont[illegible], advised them of my difficulties and asked if they [illegible]ould accept me in APC (area of positive control) with[illegible]st my standby compass." His tacan and SIF were oper[illegible]ng normally. Center accepted the pilot and advis[illegible] they would control him with vectors. His course tend[illegible] to be irregular but as he drifted off course Center woul[illegible] straighten him out with vectors. Approximately 30 m[illegible]les east of Texarkana he noticed an undercast form[illegible]g below him.

As the pilot leveled off at FL 330 the *oxygen system again went to full force.* The pilot was unable to keep the flow from escaping from around the mask. He started cycling the oxygen switch to provide oxygen intermittently and had to make his radio reports without oxygen. Center was advised of the problems but the pilot continued his homeward flight and took stock of his oxygen supply at four liters. Plenty. While busy with the oxygen problem he noticed that his gyro settled at a left-wing-down position. He was above the cloud deck but barely. The undercast had gradually come up to meet him. The cloud tops were at FL 310. Just past Memphis (not quite half way home) *the oxygen supply was down to one and a half liters!* "I expected the regular supply would be exhausted about Spartanburg and I still had the emergency supply and I expected the clouds would be gone between Spartanburg and Raleigh-Durham," said the pilot. Center continued to keep track of the flight but the pilot's tacan headings were 10/15 degrees off of Center's instructions. *This irritated the pilot.*

At the halfway point the pilot was 1000 lbs ahead of fuel schedule. When the oxygen reached one liter on the gage, it quit. "I told the Center and advised that I would continue," said the pilot. The pilot did not want to divert nor to descend into instrument conditions! It didn't take very long – five to 10 minutes – before the pilot felt a tingling sensation and noticed his finger nails turning blue. Hypoxia had set it. Again the pilot told the center of his problem and started down. In the clouds he became disoriented and was unable to concentrate. He pulled back up momentarily to on top while he looked for the emergency oxygen ring. He became mad at everyone in the parachute loft because he couldn't find the emergency oxygen release. He finally found it and after a few breaths he discovered his head had cleared.

The pilot asked Center for a steer to the nearest military base, which was Sewart AFB at Nashville – about 70 miles away. He turned toward the field (his eleven o'clock position) and requested the weather as he could see lightning flashes in the distance. "I also asked Center how far it was to VFR conditions (east) and they told me 100 miles," said the pilot. Since that meant only 10 minutes or so flying he resumed his course and told Center he would not land at Sewart. *The pilot did not declare an emergency!* After what seemed to be the longest 10 minutes in his life the pilot reached the cloud edge and started an immediate descent to 17,000 ft. (It is not known whether he got clearance to descend or not but throughout this flight he didn't have any radio trouble so it is assumed he was cleared to 17,000 ft.) Now he had a new problem. Since he was pretty low, was there enough fuel to get to his destination? He had not kept a log during the IFR portion of his flight and in view of his inability to concentrate it is doubtful if his log would have meant anything. In addition, his attempt to fly basic instruments was terrible – airspeed and attitude were erratic; flying a heading on the wet compass was unbelievable. The pilot said later, "I was 100 miles behind the aircraft."

The various Centers stayed with the pilot and finally turned him over to NAS Norfolk tower. The surface wind was reported as 280 at 3 kts. The pilot requested a downwind entry into the pattern for runway 28, told the tower of minimum fuel and called the base with *"two down, nose gear unsafe."* The pilot called again at the 90 and was advised that the wind was 020 at 12 kts. He said, "You've got to be kidding." The tower replied, "We've just had a wind shift." The pilot, worried about his fuel, continued his approach to runway 28, touched down lightly at the 2000 ft marker and breathed a sigh of relief when he saw the nose gear indicator go SAFE. The pilot called the tower, "Taking the gear this pass." He dropped his hook in midfield and went into the arresting gear at 90 kts 10 ft left of center and stopped. Then, he said, "I taxied to the line and shut down."

The lessons to be learned from this accident-waiting-to-happen are too numerous to cover in detail here. One point for certain is that fiction can't compete with real life. Who would believe this if it was made up? In order to stimulate some ready room discussion the following points are submitted:

- The pilot should have shut down on the line at Dallas and had that oxygen discrepancy corrected.
- Since he didn't do that, he should have returned to Dallas when he lost his RMI.
- If he elected to continue after these two incidents then certainly a 180 over Texarkana when the oxygen pressure almost blew off his face mask would have been prudent.
- Finally when his oxygen supply reached two liters he should have declared an emergency and landed at Memphis or any military field which was VFR.

This pilot backed himself as far into the corner as he possibly could. "Get-home-itis" is not new and it certainly does not need repeating. ◄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I hate TIGERS!

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I didn't want to be a tiger!
I refused to vote for the tiger!
I'm tired of tiger emulation and I think
it's high time the tiger image is
exposed for the hoax it is.
That's why I say

to hell with Tigers!

Adapted from 2nd Marine Air Wing, "Hot Dope Sheet."

FROM the day I set foot in the Indoctrination Battalion at Pensacola, I had the tiger jammed down my throat sideways and I'm full up to here. Oh, I'll admit I was fooled for a long time. I was right there with the other skinheads, quavering under the malevolent gaze of arrogant BCOOD's who were all of three months ahead of us in the flight program.

"Are you TIGERS" they'd shriek as they strutted up and down the ranks.

"Yes, sir!" whooped me and 37 other suckers.

"Then growl!"

And 38 full grown men strained their sing strings to imitate a beastly bellow.

Stupid? Sure! But there was method to this madness. This, my friend, was an image in the making. The image of a goer. An aggressive guy who feared nothing – so what if he brought the bird back with permanently increased dihedral, he shot the other blighter down, didn't he? And so, we became TIGERS, the image of aggressiveness.

But with the inflation of bird costs, it was found that this breed of beast was no bargain. So in 1957, the pressure was on to eliminate the black aces from the deck. The emphasis changed. It was no longer in vogue to be just a tiger. They began discriminating even among tigers. Now they wanted *smart* tigers. And through this emphasis the TIGER talk turned to TIGER tutelage and a big campaign ensued to stamp out the species that was all claws and no brains.

Bye and bye, some of these brainwashed beasts began to escape to Madison Avenue. And wouldn't you know it, the proliferation of tiger imagery invaded every aspect of our civilization. It got on our tires, in our gas tanks, even in our toilet kits. And, by golly, I think it's high time to halt this harassment.

So, what is a tiger? The encyclopedia says it's the biggest pussy cat in the world. Not only that, but the beast is just covered with yellow stripes. Rudyard Kipling's description depicts this animal as the outlaw of the jungle. He kills not only for need of food but also for the love of blood. He is feared by all the other animals for his viciousness and cruelty and hated for his treachery. Although this story is not true, it gives a fairly accurate picture of the tiger's nature as *judged by human standards.* Animals do not behave according to a code of ethics or morals like ours – so says the encyclopedia again.

How 'bout it now, mate? You still wanna' be a tiger?

Now I wouldn't be engaging in this image immolation if I couldn't submit a superior substitute. Frankly, I can think of several images superior to the tiger but *the* supreme symbol of superiority seems to be man himself. At this point I must admit to a certain amount of discrimination and an aversion to mediocrity. When I speak of man, I'm not referring to the plethora of Dagwood Bumsteads and Pappy Yokums which have become symbols of a secure society. I'm speaking of a man who is willing to pit himself against any worthwhile challenge and put his money where his mouth is. Since we're in the man-machine business, let's look at some images of men who manipulate machines.

One of the most competitive fields of human endeavor is the automotive racing business. The object of this sport is to get more out of a machine than

anyone else. And the stakes are pretty steep. If a man is wrong in this game he will soon be eliminated by insolvency – nobody can afford to back a loser – or he may end up dead wrong. So the men at the top of this game are a pretty special breed. Let's take a closer look.

In the March 1968 issue of "Popular Science Magazine," Smokey Yunick, a top flight racing mechanic, discusses the racing driver. Some of his insights may surprise you and give food for thought in the flying business.

He discusses what a successful racing driver is and what he is not: "He is not a daredevil. He doesn't get scared. He takes chances in a dangerous game but they are all calculated chances. He knows what he's doing. He drives his car; the car doesn't drive him. He's skillful. He has self-confidence. When you see him on the track, driving like the wind and daring to slip through holes in heavy traffic, he's not really working that hard, he's relaxed. Everything that is happening to his car is exactly what he has anticipated.

"It doesn't occur to him that he is taking chances. He is by nature two things. He is a businessman in a well-paying sport, like a top-notch ballplayer and he is absolutely dedicated to racing.

"He's smart, he's shrewd. If there's any glamour in the business, he leaves it to others. He is concerned with one thing: getting around that track faster . . . ."

Recently a series of TV advertisements has implied that management is having second thoughts about the tiger image as an advertising gimmick. Of course, public reaction is an emotional, unreasoning plebiscite in favor of the chuckleheaded cat. (But the fact that someone even questioned the adequacy of the image in aviation shows we can improve performance by elevating our aspirations.)

Smokey Yunick says: "The image of the racing driver has changed drastically in the last 15 years. Most of the men who occupy the cockpits today are of the 'junior executive' type, equally at ease in a business office, a drawing room or on a speaker's platform." He further says: "I have never known a driver who consistently finished in the money who was not also a good mechanic – an expert on engines, suspension or general design."

It is recognized that technology has made it almost impossible for a contemporary pilot to fix his own aircraft. But it is a well known fact that the more you know about a machine, the more you can get out of it. Aggressiveness is not the ultimate key to success. Dedication and study are the means of mastery and such characteristics are not intrinsic attributes of a tiger's temperament.

So why not take steps to keep all of those big, yellow striped pussy cats out of aircraft cockpits? Let's replace the tiger with a smart, shrewd man who is completely dedicated to getting the most out of his machine; an intelligent *man* who has his goal clearly fixed in mind and strives tirelessly to achieve this goal; a man in a machine, not a beast in a bird. ◄

Any crew that can preflight in 10 seconds flat is apt to be buried in less than that.

Even Chance

WHEN an A-6A on an evaluation flight began to mush in on final during a landing approach, the pilot in the right seat made preparations to eject. His experience, which follows, can only be matched by the pilot's performance in successfully flying the aircraft out of the trees and continuing to a safe landing at the field nearby.

"At about 200 ft above the trees I made some preparations for ejection by placing my right hand on the face curtain and ensuring that my feet were properly positioned. The pilot added full power and retracted the speed brakes at this time and kept the airplane flying straight ahead with the wings level. I put both hands on the face curtain and waited and watched. At about 20 ft above the tree tops I ejected since we were still in a stalling condition and still losing altitude.

"When I left the airplane, I gave myself less than an even chance of escaping serious or fatal injury because of the dense wooded area that we were over. I thought that if the seat works properly, etc., I will slam into a branch or tree trunk with a force that will be difficult to sustain. The ejection was routine (if that exists) in all respects as far as I could determine. I felt the chute either blossom or start to blossom followed by, in less than one second, the jolt of the chute catching the tree tops. I was still in more or less horizontal flight when the chute caught the trees. However, as good luck would have it, I swung down to a very gentle landing since the tree top height was just sufficient so that my feet barely touched the ground. For reasons which I cannot explain, I looked at my watch and noted the time to be 1615."

Ho hum, time to secure.

GOOD SHOW

LT David M. Gist, VA-122

AFTER 1.3 hours of flight on a scheduled tactics hop in an A-7, LT Gist, the pilot, noticed he had only 3000 lbs fuel remaining. When the fuel decreased rapidly to 2700 lbs during the next few minutes, he headed for the initial approach fix.

Weather at the field was 300 ft overcast and 3/4 mile in fog, tops at 1800 ft. LT Gist declared an emergency – with the fuel quantity continuing to drop rapidly as he descended.

The wingman verified that fuel was streaming from the bottom of the aircraft. LT Gist made a modified radar controlled descent and at 5 miles from the field, the fuel quantity gage read 500 lbs.

He broke out at the field boundary at 300 ft with the fuel quantity gage reading ZERO. He was fast so he secured the engine over the end of the runway and managed to land the aircraft 6000 ft down the runway, successfully bringing the aircraft to a stop on the runway with no damage to the aircraft or injury to himself.

Only a short 10 minutes had elapsed from the time LT Gist noticed he was losing fuel until the ZERO fuel quantity indication over the field boundary.

ComNavAirLant noted that only seconds and expert airmanship prevented this incident from becoming another aircraft loss. To which APPROACH adds a well done. The timely action and professional airmanship displayed by LT Gist saved our Navy a very valuable *Corsair.*

Investigation revealed a failure of the Reducer, PN AN 894D 8-6 (item 60, fig 5-21 on page 69 of NavAir 01-45 AAA-4-5), which is installed in the Smoke Abatement Ejector, PN 215-53105-1. Further investigation of the failed part revealed insufficient wall thickness of less than 1/64-inch. The overall length of the failed part was 1 3/8 inches while another part, PN AN 894D 8-6, measured 1 9/16 inches and had sufficient wall thickness of 7/64-inch.

ComNavAirLant msg 231607Z of Nov 68 recommended that all operating units having this part in any system of their aircraft perform a one-time inspection to determine, by measuring the overall length of the Reducer, if PN AN 894D 8-6 has sufficient wall thickness. It was further recommended that all activities having cognizance of subject part screen them for proper length and those not meeting the specified length be removed from stock. ◄

FY-66 – *FY-69

	FY-66 Number/Rate	FY-67 Number/Rate	FY-68 Number/Rate	*FY-69 Number/Rate
All Navy	476/1.27	510/1.37	513/1.41	247/1.36
Helicopters	79/1.61	102/1.91	95/1.72	49/1.74
H-1	4/1.04	14/2.51	23/2.55	18/3.86
H-2	11/2.67	12/2.77	12/3.01	4/2.15
H-3	6/ .68	12/1.34	7/ .75	4/ .85
H-34	47/1.79	43/1.89	21/1.12	9/1.14
H-46	3/ .90	17/2.26	24/2.61	12/1.78
H-53	1/	1/1.11	8/3.03	2/1.57

These figures do not reflect accidents due to direct enemy action.

*First half only

FIG. 1

The H-2C is Kaman's latest helicopte

CHOPPER PROBLEMS

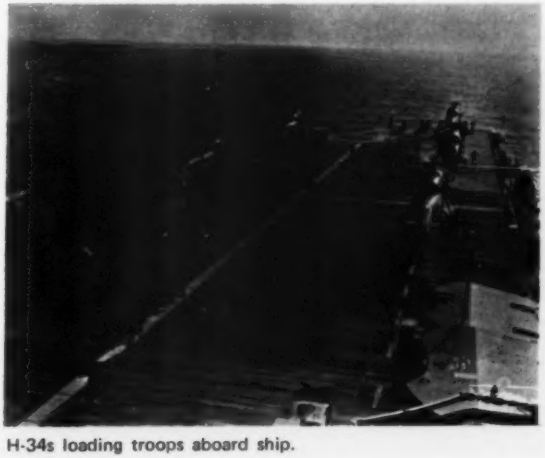
HELICOPTER operations are twice as hazardous as they need be. For the past three and half years, enough to establish a trend, there has been a gradual rise in the number of accidents and a corresponding increase in the helicopter accident rate. It is high time to reverse this trend. There is a paradox here with the better trained person entering the fleet from the training command, flying better equipment, yet having more accidents. For instance the number of helicopter accidents during the past three and a half years has risen from 79 in FY-66 to 102 in FY-67. The accident rate has increased from 1.61 to 1.91. These figures are for helicopters only and the rate is considerably higher than the all-Navy rate for the same period of time. Lest one is lulled into a false sense of security let it also be said that the number of fatalities and the dollar cost of these accidents have all risen. Few areas exist, if any, where one can rationalize. Where the all-Navy rate has risen 10 percent the helicopter rate has risen twice that – almost 20 percent.

The statistics shown in Fig. 1 reveal an increase of 37 accidents from 476 to 513 in the Navy and during the same period an increase of 16 accidents from 79 to 95 in helicopters alone (high of 102 in FY-67). At the same time the all-Navy accident rate has increased .14 per 10,000 hours the helicopter accident rate increased .30 in FY-67 alone. In order to keep the proper perspective it is necessary to keep the number of accidents and the accident rate together. One may draw any number of conclusions from the statistics shown but the inescapable fact is that most helicopter models experienced an increase in the number of accidents and a subsequent rise in accident rate. Of all the models the H-34 remains the work horse. It regularly accumulates approximately half of all helicopter flight hours. It is the only model to show a decrease in both the number of accidents and the accident rate. The other helicopter models which are still in the inventory, but which are not shown, have been disregarded since they have negligible impact.

What kinds of accidents are happening to cause this black mark for the helicopter community. They run the gamut of all kinds of accidents but the five main areas are: collison, ground; collison, water; collision, other; airframe failure; system failure. A 24-month sample during calendar years '66 and '67 was used to determine

Salt water causes engine encrustation.

An H-34 in rugged terrain.



H-34s loading troops aboard ship.

these kinds of accidents. Over 100 accidents due to collisions took place. Airframe and system failures accounted for an additional 33 accidents.

It seems reasonable that a look at what causes these kinds of accidents might help in understanding this unsatisfactory accident history for the past three and a half years. It is not quite as easy to assign categories to primary causes as one might think. The base spreads way out when one considers the inexhaustable number of reasons for helicopter accidents. It becomes difficult for the analyst or statistician to group them. However, some statistics are available which are meaningful. The one biggest cause of accidents is engine failure. Also ranking high on the list are NATOPS deviations, forced landings and fires.

Finally, let's consider briefly who or what is blamed for these accidents. Pilots, other personnel (support) and material were responsible for about 82 percent while the remaining 18 percent of the causes were miscellaneous or undetermined.

An SH-3A pauses to refuel.

PERSONNEL AND MATERIAL CAUSES

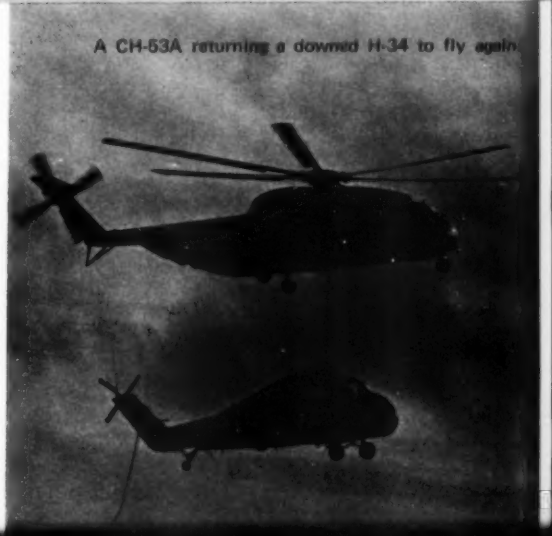
	FY 66			FY 67			FY 68		
	P	OP	M	P	OP	M	P	OP	M
H-1	-	2	1	5	1	3	8	3	10
H-2	4	1	4	6	1	3	5	1	6
H-3	1	-	3	5	-	4	2	1	2
H-34	21	2	20	14	3	20	8	1	9
H-46	2	-	-	6	2	7	5	3	13
H-53	-	1	-	-	-	1	7	-	1

Key: P - pilot; OP - other personnel; M - material

Fig. 2

An H-46 vertrep underway.

A CH-53A returning a downed H-34 to fly again.



The H-1 packs a punch.

In explanation of the statistics shown in Fig. 2 it must be pointed out that only the primary cause is shown and in many cases there were important contributing causes. The contributing causes are not included here. Personnel factors change very little throughout the years but numbers do. For example pilot-caused accidents are always the highest of personnel causes. During the period under study pilot-caused accidents represent about 36 percent. Other personnel (support) were responsible for about 8 percent of the accidents. Material failures were judged the primary reason for about 38 percent of the accidents.

As seen in Fig. 2 the most fertile area for improvement lies with the man at the controls. One important area of pilot-caused accidents was previously mentioned – violation of, or deviation from NATOPS. Many will say one cannot follow NATOPS in Vietnam but, quite the contrary, adherence to NATOPS will permit better and safer operations anywhere – including a war zone. Another factor in improving human performance is a continuing training program. Advanced training means a better pilot when the chips are down and maximum performance is required. This is especially true of Marine and Navy pilots in Vietnam where pilots and machines are constantly approaching the upper limits of the human and flight envelopes. A third factor which can enhance pilot performance is supervision. During fleet exercises, during heavy flight schedules in the training command and during Vietnam operations it is incumbent upon commanding officers, operations officers and flight surgeons to be cognizant of the health and mental attitude of pilots and flight crews at all times. Officers-in-charge of detachments are included in this group also. As the tempo of operations increases and becomes sustained the "boss" must be continuously alert to any changes in the norm. Individual pilots on detached duty must temper willingness with good common sense. It is extremely important to recognize the difference between can-do spirit and bad judgment. The line between them is not as fine as one might suppose.

Through the years accidents caused by maintenance personnel and by material failure/malfunction have become lumped together. There are some valid reasons for this grouping but in this article maintenance causes are included in other personnel (support). Maintenance errors are people-caused but material failure/malfunction in the main, are not. But, on occasion this type of failure may be maintenance-induced. For example, a bearing failure results from the lack of, or improper lubrication due to the omission of a required maintenance action. The material failure then is attributable to maintenance error. No implication is intended that material failure/malfunctions cannot be improved. They can. Maintenance errors are on the rise and there are several ways which these errors can be and should be reduced. One submits that pride in doing a job right is an area where everyone can do something constructive immediately. Also, as is the case with pilots, training should be a continuing program. Upgrading skills and knowledge is satisfying to student and instructor alike. Maintenance on-the-job training is one of the best ways of upgrading skills and knowledge yet devised. Lastly, another method of reducing maintenance errors is through effective quality assurance and supervisory efforts. A supervisor who is known for his tough, thorough inspections is a supervisor worth his salt.

Although the number of helicopter accidents attributable to other personnel (supervisory and support) is small in comparison to pilot-caused and material-caused accidents it still is significant. A review of other personnel-caused accidents indicates that many are caused by nonaviation personnel and can be grouped, generally, as landing zone, loading and hookup accidents. It appears that better education and training of these types would pay good dividends. The troops who direct helicopters into rough terrain landing zones must be advised of the necessity for: adequate rotor blade clearances, the absence of logs and stumps and firm ground if touchdown is desired. The LSEs (landing signal enlisted) aboard nonaviation ships must ensure adequate clearances and above all that the helicopter is completely over the landing zone (platform) before giving the signal to land. Similarly persons engaged in loading helicopters (internally) and preparing hookups (externally) need to be trained and supervised to do the job right.

In summary there are many, many ways in which to improve helicopter safety. Pilots, mechs and troops all making a concerted effort can make a substantial reduction in the number of accidents and corresponding lower accident rates. ◄

Fewer accidents along the line should be the all-hands motto for '69.

The Positive Approach to Safety

By CDR H. L. Fremd
Training Analyst
Naval Safety Center

YEARS AGO the local witch doctor would conjure up brews and far-out dances (with proper accouterments) to drive away evil spirits and cure other assorted ills. By and large, the primary ingredient in any such cure was fear – either the direct type (scare hell out of 'em) or the indirect type (fear of the unknown). We all know that for the most part, medical science has advanced beyond this type of treatment, except for the flu shot, but are we in the field of naval aviation safety able to make a similar claim? We all see gory pictures of aircraft crashes, bodies, damaged facilities, etc., promoting (?) safety but is it valid in this enlightened age to resort to medieval tactics to get people to really believe in safety?

There is some evidence that some individuals will heed nothing less in the way of warning. Moreover, many of us – you and I – lack the imagination, ambition and time to present a better case for safety. We tend to think of safety in the same way some people think of religion; it's here and it's difficut to object to the idea of it but we don't want to be bothered with it all the time. Nevertheless, an appeal to the finer sensibilities undoubtedly offers the greatest potential for improved safety.

Fortunately, there *are* many who are willing to give the idea of safety – positive safety – more than just lip service. Just how are you and I exposed to the idea of positive safety? First and perhaps most well known is NATOPS. In this series of publications an attempt is made to help pilots and other associated personnel learn from the mistakes of others. NATOPS lends continuity to any and all phases of aviation during the "change of watch" as well as being a ready, current reference for the novice and pro alike. Yet, from time to time, we still hear those who say, "We can't operate by the book." Maybe not; maybe the book is inadequate but has anyone taken the time to prepare and submit the changes necessary to update the book?

It's easier to suggest that the system is inadequate than it is to offer a positive plan for improvement. If *you* really believe in a positive safety program, take the time and make the effort to recommend improvements in the system whenever you see the need.

Another area of positive safety is the 3M system. Sure, it is troublesome to change our concepts and ways of doing things but as this program becomes more productive we see our supply problems diminish, problem areas being pinpointed earlier and, funds permitting, corrective action being initiated. Here again is a positive approach to safety.

The aviation safety officer who is fully supported by the C.O. is a positive force for safety. And the C.O. who believes in the positive approach to safety will do well to ponder these questions:

- Is your ASO selected from the best qualified and most highly motivated officers in the squadron? He should be as he represents *you* in matters of safety.
- Is he selected for all the "good deals" that come along, i.e., fund drives, courts and boards, etc? He shouldn't be; safety is a full time job.
- Is he given active support at all pilots' meetings and during the conduct of safety surveys all the year and not just around AdMat time?
- Do you have periodic talks with your ASO and provide positive guidelines for your safety program?
- Do you ensure the wholehearted cooperation of all other departments in the squadron?

This is by no means a complete list of pertinent questions but only a starter – food for thought if you will.

Now that we have considered the command element in the positive approach to safety, how about you, Mr. Pilot and Mr. Maintenance Officer – and you, Mr. Plane Captain? Give these questions some thought:

- Have you thought about ways to do your job more effectively and safer? If so, have you discussed your thoughts with your ASO; and if not, why not?
- Are you reporting your experiences in order to help others – URs, incident reports and Anymouses?
- Do you *help* the ASO in his safety surveys or are you always trying to "cover your six?" If you are wrong, do you admit it and strive to improve?
- Do you try to beat the system? You shouldn't. If the system does not provide the framework for correct and safe operations, recommend the needed changes.

These points we have just covered are not intended to point the finger at any area except safety. The positive approach dictates that safety be regarded as a way of life to be cultivated not only in our chosen field but in all aspects of everyday life; it will pay great dividends in the long run.

If you have a question concerning any phase of instrument flight for which you cannot find a satisfactory answer, send it to the Commanding Officer, VA-127, NAS Lemoore, Calif. 93245, who has volunteered to do the necessary research and supply the answers.

ON THE GLIDE SLOPE

TERPS is Here to Stay

IN SEPTEMBER 1966, the United States Standard for TERPS (Terminal Instrument Procedures) was published. In the Navy, it is also recognized as OpNav Instruction 3722.16A. This publication prescribes standardized methods for use in designing instrument approaches. Naval aviators, of course, have very little to do with the actual design of instrument approach procedures but they are responsible for correctly interpreting the information depicted on approach charts. Conversion to the TERPS criteria is still not complete; however, many DOD approach procedures are depicted in the TERPS format. Many pilots still are operating in the "Stone Age" insofar as interpreting the landing minima information shown on the new approach charts. Therefore, a review of these procedures is deemed appropriate. Following is an explanation of the TERPS landing minimum criteria.

Approach Categories: The first essential step in interpreting the minimums format is to determine the approach category of the aircraft. Minimums are specified for the various aircraft speed/weight combinations. Speeds are based upon a value 1.3 times the stalling speed of the aircraft in the landing configuration at the maximum gross landing weight. An aircraft can fit into only one category in which it meets either specification. For example, using the speed/weight criteria listed above, a 16,000-lb aircraft landing weight with an associated approach speed of 135 KIAS would place the aircraft in category C. The same aircraft conducting a circling approach and using a circling maneuvering speed of 150 KIAS would then use category D criteria.

Approach Category	Speed/Weight
A	Speed 50-90 kts, weight 30,000 lbs or less.
B	Speed 91-120 kts, or weight 30,001-60,000 lbs.
C	Speed 121-140 kts, or weight 60,001-150,000 lbs.
D	Speed 141-165 kts, or weight over 150,000 lbs.
E	Speed over 165 kts, weight not considered.

Approach categories for specific military model aircraft are listed in Section I, FLIP.

MDA-Minimum Descent Altitude: The MDA depicted in the landing minima format is simply the lowest MSL altitude to which descent is authorized on final approach or during circling-to-land maneuvering.

DH-Decision Height: DH which is also depicted as MSL, is the altitude during the approach at which an immediate missed approach must be executed if the runway environment is not in sight. DH pertains to precision approaches only (ILS and PAR).

Descent Below MDA or DH: Aircraft are not authorized to descend below the MDA or DH until the runway environment is clearly visible to the pilot and the aircraft is in a position to descend for a normal landing. (Runway environment is considered to be the runway itself, other approved lighting aids or other markings identifiable with the approach end of that runway.) If upon arrival at the missed approach point, or any time thereafter, any of the foregoing requirements are not met, the missed approach procedures shall be immediately executed.

HAA-Height Above Airport: HAA is the height of the MDA above airport elevation expressed in AGL values.

HAT-Height Above Touchdown: HAT is simply the height of the DH or MDA above the highest runway elevation in the touchdown zone (first 3000 ft of runway) and is expressed in AGL values. Runway touchdown point

elevation will be depicted on the aerodrome diagram.

Note: Aircraft equipped with radar altimeters could set their warning lights at the HAA or HAT provided that the terrain at visibility minimums along the final approach course was at or very near the airport or touchdown point elevation.

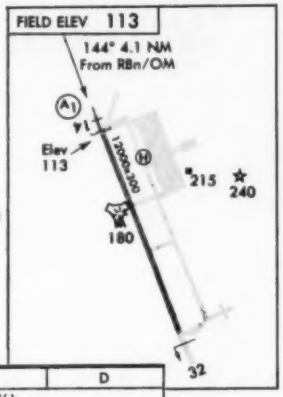
Further examination of the HAA reveals that it is usually lower than the ceiling minimums for the approach. This difference will facilitate placing the aircraft under the minimum ceiling value when at the MDA.

Ceilings and Visibilities: The ceiling and visibility values shown in parenthesis are for use by military pilots to determine weather criteria for filing and commencing approaches in accordance with their respective military directives.

RVR – Runway Visual Range: The value immediately following the MDA or DH represents the visibility minimum for the approach. When the visibility is separated by a short line (/), it is RVR (add two 0's for total figure). When the visibility is separated by a hyphen (-), then it is meteorological visibility. If RVR is not available or is not operating, then the visibility value shown in the parentheses is governing. RVR minimums only apply to straight-in approaches.

Figure 1 shows the TERPS landing minimums format and aerodrome diagram for a typical tacan approach procedure. Figure 2 shows the TERPS landing minimums format for the radar approaches as depicted in the IFR supplement. Although the formats are portrayed differently, there is *no difference* in interpretation of the terms contained on both formats. Considering Figure 1, a pilot flying a category C aircraft and desiring a straight-in tacan approach to runway 14 would use the minimums information following the S-TAC-LOC-14:

MDA – 400 feet MSL
Visibility Minimum – 5000 feet RVR or 1 mile
HAT – 287 feet AGL
Ceiling Minimum – 300 feet



CATEGORY	A	B	C	D
S-ILS-14	313/24 200 (200-½)			
S-TAC-LOC-14	400/50 287 (300-1)			
CIRCLING *	560-1 447 (500-1)		560-1½ 447 (500-1½)	660-2 547 (600-2)

* Not authorized East Rwy 14-32
High terrain East

Figure 1

RADAR – 327.5 396.1 338.6 142.02 134.1 126.2 (E)

ASR	RWY	CATEGORY	MDA RVR	HAA	CEIL-VIS
	32	A, B, C, D, E,	400/50	287	(300-1)
	14	A, B, C, D, E,	480/40	367	(400-3/4)
PAR	RWY	CATEGORY	DH RVR	HAT	CEIL-VIS
	14	A, B, C, D, E	213/16	100	(100-1/4) GS 2.75°
	32(MPAR)	C, D, E	345/50	240	(300-1) GS 2.50°

Figure 2

If the same pilot was desiring the same tacan approach but circling to land on runway 32, then the minimums information for his approach category following the *CIRCLING* would be used:

MDA – 560 ft MSL
Visibility Minimum – 1-1/2 miles
HAA – 447 ft AGL
Ceiling Minimum – 500 ft

From figure 2, the PAR minimums for runway 14 are as follows:

DH – 213 ft MSL
Visibility Minimum – 1600 ft RVR or 1/4 mile
HAT – 100 ft AGL
Ceiling Minimum – 100 ft

Minimum Adjustment: The minimum depicted for PAR approaches must be adjusted by pilots or single-piloted aircraft whenever the published minimums are less than the OpNav absolute minimums of 200-1/2, In the above example for a PAR to runway 14, single-piloted minimums would be adjusted to:

DH – 313 ft MSL
Visibility Minimum – 2400 ft RVR or 1/2 mile
HAT – 200 ft AGL
Ceiling Minimum – 200 ft. ◄

Waveoff Emergency

A ROUTINE training flight in an SP-2H was being conducted; at least it was routine until the final landing was attempted. The wind had been high and gusty all day but never was more than 20 degrees off the runway heading. By this time, the student had demonstrated proficiency in GCAs, waveoffs and 20-degree flap landings before a 20-degree flap final landing was attempted.

The pattern was good all the way to touchdown but on landing the aircraft was flat and bounced into the air. The student was directed to take a waveoff. Almost full power was added on the jets and recips and a slow pitchup of the aircraft followed. The instructor believed this was caused by the student not putting in enough forward pressure and varicam as waveoff power was added.

The instructor waited several seconds as the pitchup continued expecting that the student would take corrective action. When it was apparent that the student was not taking effective action, the instructor took the yoke and pushed forward, simultaneously attempting to run in nose-down trim. The yoke pressures were extreme and varicam seemed to have no effect as the nose of the aircraft continued its upward travel.

Realizing that a bonafide emergency was underway, the instructor reached for the emergency varicam but felt a hand already on it. He then rolled into a 60-degree to 70-degree angle of bank and selected full flaps. The high angle of bank was necessary to get the nose to fall through as power had not been reduced. The nose fell through at 70 kts indicated airspeed (which may not have been a correct reading) and recovery was effected at 200-300 ft, 120 degrees off the runway heading.

By this time much of the up varicam had been taken out by the student, who had taken control of the emergency varicam.

What caused this uncontrolled flight? The varicam was checked out thoroughly on the ground and no malfunction could be found. The plane captain recalls the instructor calling, "Get the varicam." He says he selected emergency varicam but was worried about the power so did not toggle the varicam down. Probably these words were directed at the student instead of to the plane captain.

If the trim switch was placed in the emergency position before the instructor or student actuated the normal varicam to nose-down trim, the normal varicam would have been inoperative. Another possibility exists – that the varicam went past the limit switches to the overlimit switches rendering the normal varicam system inoperative. The plane captain had been briefed to call out the varicam low pressure warning light if it came on during touch-and-go landings; however, he does not recall the light coming on. This would have been the indication of the varicam traveling past the normal limits. The exact cause of the malfunction can only be supposed.

These things we do know for certain. Many ordinary conditions can rapidly lead to an emergency if corrective action is not taken. Emergencies, especially in the landing phase, sometimes are not evident until the situation is rapidly

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

getting out of control. For the unsafe condition to be corrected, it must first be recognized. The several seconds taken to recognize an emergency might be the difference between a hairy situation and a relatively safe emergency.

The instructor involved does not intend to ride the controls during every student landing as this defeats the purpose of training new pilots and building their confidence. However, he has in his own mind reviewed those situations, including waveoffs, where several seconds might make the difference in safe or uncontrolled flight and intends to avoid them in the future.

VP SQUADRON ASO

It is possible that the student erroneously kept feeding in nose-up varicam during the approach and landing until the nose-up overlimit switch was actuated at 7-1/4 degrees nose-up. This would have rendered the normal varicam system inoperative. If this did occur, the low pressure warning light should have illuminated, but it may have been overlooked in the confusion. The probability that the nose-up overlimit switch was actuated is considered unlikely, however, since only a slight amount of nose-up varicam would normally be used on a 20-degree flap landing.

Another possibility, even more remote, is that the student fed in varicam in the wrong direction on waveoff, due to excitement and confusion.

In view of the thorough postflight check which failed to uncover any malfunction in the varicam, the possibility must be considered that this incident was caused by other factors. One possible solution is this:

The student attempted a waveoff under almost full power. The varicam setting would be a slight nose-up position at this time (for landing). The nose would have a normal tendency to rise rapidly with the application of full power and would be aggravated by any nose-up varicam. Due to the lack of experience (and possibly to his lack of preparation), he was surprised by the unexpectedly high yoke forces. Confronted by this opposition of the yoke to forward movement he may have been reluctant to exert the necessary force to move the yoke forward *and instead may have simply held the yoke where it was.* Where it was, *was the nose-up position. In the excitement of the rapidly deteriorating situation, the student may have forgotten all about the varicam.*

By the time the instructor assumed control of the aircraft, it had rotated to such an extreme nose-high position that normal rate of varicam movement would have been insufficient to salvage the situation. The situation in this case was salvaged by the instructor rolling the aircraft off on its wing and though he may have been assisted by the varicam, its rate of movement was such that this assistance could not be definitely recognized by the instructor. Furthermore, any nose-down pitching moment which would have been provided by the dropping of full flaps may have been delayed by the fact that a priority valve in the hydraulic system gives the varicam priority. It is also to be noted that while the roll off on a wing enabled a successful recovery, NATOPS additionally calls for a reduction in power for recovery from full up (runaway) varicam.

So much for conjecture. What this incident proves is the need for the instructor to maintain positive control of the situation – even when a student is actually flying the aircraft. This is not always easy but it can be done and it must be done.

In this case an exhaustive preflight discussion with the student of the longitudinal control pressures to be expected on waveoff may have prevented this incident. How exhaustive should such a discussion be? Only the instructor can say. Once the minimum prescribed briefing has been complied with, the rest is up to the instructor. It's part of his instructional technique. This particular instructor says he does not intend to ride the controls with every student but if he launches with a student who is inadequately prepared for all aspects of the flight he should be prepared to ride the controls; otherwise, there is going to be a period, however short, during which the student is behind the aircraft. And, if the instructor is not at the controls, the aircraft will be momentarily out of control. The only way an instructor can afford not to ride the controls – that is, sit back and let a student fight a situation out to a solution without any interference – is when he know*s the student will succeed. And the only way he can* know *this is to insure beforehand that the student is thoroughly prepared for the entire flight.*

Finally, there seems to have been some confusion among the crew in this incident as to who would do what. When the instructor called, "Get the varicam," the plane captain thought it was meant for him when in reality it probably was directed to the copilot (student). In this connection it is noted that NATOPS does not specify the assignment of the plane captain to any duties connected with the inflight operation of the varicam system.

All crewmembers must be thoroughly briefed prior to flight on what duties they are to perform if confusion is to be avoided. ◄

HELL'S FIRE

By LCDR A. E. Weseleskey

COMBAT PATROLS, even over Viet Cong territory, can be mighty boring. Our crew had been up since sunrise covering the movement of a half dozen River Patrol Boats (PBRs), those fiberglass wonders of the Mekong Delta. The PBRs had been transiting through a canal in a known VC inhabited area. The canal transit should have brought some action but it hadn't. They had transited the narrow confines of the canal without receiving a single Viet Cong sniper round.

During the two morning flights I'd become a little uncomfortable as the long hours passed. It was hot and humid; sweat poured down my back and warm beads of salty sweat dropped off my bushy brows into my eyes.

I wanted to shed my gloves, peel off my nomex flight suit and trade in my leather flight boots for some shower sandals and a swimsuit. All the discomfort from the heavy ceramic chest plate (body armor) didn't detract from my growing unpleasant disposition either; I was darned tired and I knew the crew was too.

Continued

They seemed restless. As I brought the fire-team of two UH-1B gunships in for final landing at our home base I relaxed and thought, "This is a good day for one of those lazy afternoon naps and I'm going to get one. Heck, there may even be hot water for showers today, after all, it is the end of the month!" I looked at my copilot and said: "Will, you've got it; go ahead and make the landing."

"Silent Will" nodded his head as he stowed the flex-guns and reached for the controls.

Will slipped our lead aircraft into the narrow revetments with ease. He was a fine pilot, an extremely capable first tour aviator who watched, listened but seldom spoke. The rotor coasted down while I set up the cockpit switches for the next crew; everything had to be ready in case a *Scramble* came from the boats. *Quick reaction* was the key to success in our operations.

"*Fire, fire . . . fire on the line!* Look over there!" my gunner shouted as I looked across the runway.

A low rumble followed by a KA-WUMP caused me to focus on a revetment across the steel runway . . . a UH-1C gunship, with a 3000 gallon JP-4 tanker truck plugged into it, had just erupted in flames.

I found myself in a dead run across the runway with the small fire extinguisher from our aircraft in my hand. Fuel seemed to be spilled on the ground beneath the aircraft and the fire was rapidly spreading over it. No one was in the cab of the fuel truck and two men in fatigues with small portable CO_2 extinguishers were desperately trying to contain the flames that crawled up the side of the armed helicopter. Their valiant efforts were futile as the fire spread beyond their control. The fire had now started up the fuel hose which was still connected to the gunship and the truck appeared to be catching fire too. I grabbed an enlisted man and got him into the cab of the fuel truck and told him to get it started.

"Sir, this truck may blow up any minute now!" he called back as I rushed into the revetment to retrieve the hose from the helicopter's fuel tank. My former complaint about all that hot flight gear like gloves, nomex flight suit and boots was a thing of the past now. I was able to pull on the burning hose and free it from the gunship by knocking some of the flames down with my little extinguisher. The hose dropped to the ground dumping fuel all over the deck. It was impossible to get to the burning nozzle now as it poured flaming fuel all around us. I heard the truck's engine roar and turned to see the side of its tank covered with flames. I jumped to the running board to protect the driver from the heat and opened up my CO_2 bottle to cool down the side of the cab. As the driver pulled away, the hose continued to siphon fuel onto the ground and spread the fire.

Dropping from the truck I noted a fire truck approaching from behind the fuel truck. Things were beginning to look a little brighter (no pun intended) as I strode through the flames that followed the fuel truck. JP-4 was all around me now and I had no choice but to run through it or be cooked in it! I felt the heat and flames around me; it was difficult to breathe.

My skin felt like it was about to burst open and I could smell hair burning. "It must be me," I thought. Once beyond the burning fuel I felt unharnessed from the force of the inferno behind me. My flight clothing had miraculously protected me. The fire truck pulled up

and set its switches to pump but all it had to pump was water! Taking a hose I ran toward the gunship but then saw the fuel truck stalled just a few truck lengths from where it had been parked; it was burning like a huge smudge-pot! I opened the valve on my hose and started to knock the flames down on the truck. At least I could cool the tanker and perhaps get the fuel nozzle shut off.

While the base firefighters worked on containing the aircraft fire, I advanced on the fuel truck. I was successful in knocking the fire off the truck and the next move was to secure the fuel hose.

The fuel and fire were racing into a revetment sheltering another gunship beside the first burning aircraft. The fuel truck's cargo was about to claim another UH-1C gunship as its victim. The situation took a drastic change when the fire truck suffered a casualty and the fire hose went limp in my hands. I could scarcely believe the circumstances as the fire suddenly backflashed toward me. I was standing in JP-4 that was about to cook me if I didn't move. Fire would soon ignite the gunship ahead of me unless the fire was extinguished *or* the aircraft was removed. Again I found myself running through the fire gambling that my nomex flight suit and gloves would protect me. Mounting the UH-1C I was greeted by a young Army warrant officer who had entered from the other side of the helicopter; he had the same idea about getting this aircraft away from the impending danger. Without speaking a word he set up the switches and got the helicopter started as I pulled on a helmet and strapped in tight. By the time the rotor was up to speed we were completely IFR in black smoke and orange flames. I took the controls and commenced an instrument take-off from the confined revetment as I called the tower to clear all traffic from the runway. In a moment we climbed up through the intense smoke and turned to cross the runway toward the safety of a small pond. We were *not* on fire and although the aircraft was badly smudged and scorched it was otherwise in fine condition. After effecting a landing I turned the controls over to the Warrant Officer and ran back to the aircraft fire.

The foam truck had arrived and the firefighting crew was laying lines and initiating containment of the fire. By the time I reached the scene the fire was out on and around the fuel truck. The blackened tanker just sat there steaming.

The helicopter was still burning with savage fury. Almost as if pointing to an explosion about to happen a large flame shot out the side of the helicopter and licked at the fully loaded 2.75 inch rocket pod on the gunship's side. Those rockets were just ripe for a chain reaction of cookoffs which could send white hot steel through everything around the area. Our rockets were indiscriminate, they could kill every one of us as well as any Viet Cong.

Trusting in my good fortune and the "almost magic" of my protective flight gear I went in to jettison the pods and remove them from the area of danger. I was followed by a couple of men who found it impossible to handle the hot pod or touch the bomb rack. While it was uncomfortably hot I could handle the release because I had gloves on. A stream of foam hit me and it helped cool the metal; the men could now help carry the pods out of danger.

The stench of foam and burning JP-4, rubber and metal were almost too much to stomach. Despite the sickening wave of fear that passed through me it was obvious the fight had not been completely won. Huge flames belched up through the engine and transmission areas topside. A little Korean firefighter was trying desperately to scramble topside on the chopper to smother the blaze with his foam hose. I gave him a boost up and followed right behind him to direct his placement of the foam. The aircraft's fuel tank had obviously ruptured or burned through on top and was the source of fuel feeding the intense fire. As we stood atop the cabin pouring foam downward, the roof gave a rumble, suddenly opened up between my feet and flames shot up at us as if in protest to our efforts. My flight gear seemed to withstand the explosion and heat. My boots stopped the hot metal that tried to rip into my feet and legs. I must concede it was a most uncomfortable and foreboding feeling to have the deck almost swallow me up. Despite this unnerving experience, we were able to remain topside to quell the blaze and direct the further removal of all internal ordnance stored, i.e., hand grenades, 7.62 MM ammo, 40 MM grenades and various hand held weapons and ammo.

As I slid down from the gunship's roof I sagged a bit as I observed the hulk that was once a proud fighting machine, what we'd fondly called a *Reynolds Wrap Tank*. It was a total loss, but, we had all survived the incident relatively uninjured. I looked at my clothing; it was black, filthy and smelly. But, it had most certainly saved my life or at least prevented major burn injuries. My hair, eyebrows, arms and legs were well singed but I was mindful that strict adherence to wearing proper flight clothing had played the major role in my survival.

Before I could write the experience off as unforgettable I gathered up all the participants who had witnessed the fire and participated in the fight to extinguish it. Paperwork has it's place even in a staging area for combat missions; statements and comments had to be documented to assist in the investigation of the incident, hopefully to prevent a recurrence of such a loss. The loss was not total for we learned that during a disaster such as this, just as in combat, *Action* and *Reaction* are the keys to success. But the key factor that protected and enabled me to personally respond to the inferno was the fact I was properly dressed in the best equipment available to a naval aviator, in fact, to any aviator!

The Top of the Iceberg

SOME Navy pilots and aircrewmen wear their personal survival equipment but don't use it correctly and some don't wear various items of their personal survival equipment at all.

In Fiscal Year 1968, the most recent 12-month period for which accident and incident statistics are complete as of this writing, there were 256 instances of equipment misuse and 356 instances in which equipment was required but not worn or carried. (For categories covered see Figures 1 and 2.) These figures represent 307 aircraft mishaps. In eight accidents during this period, failure or delay in using available equipment compromised survival and/or rescue.

And this appears to be only the top of the iceberg.

With very few exceptions, the Safety Center receives information on personal survival equipment usage *only* when an accident or incident occurs. What about survival equipment usage during all the hours of safe and, therefore, unreported flights? Misuse of survival equipment, with the exceptions of such items as the oxygen mask, will, of course, be lower in nonaccident flight. Without a survival emergency the pilot or aircrewman's survival knowledge is not tested. However, the proportion of cases of failure to wear or carry survival equipment on accident flights and nonaccident flights is probably about the same.

Contributing Factor

During FY-68, at no time did misuse of survival equipment actually *cause* an accident. (Of the 75 instances of improper procedures/use of equipment (see Figure 1), the leading item was 20 misuses of the helmet visor, followed by five misuses of the nomex flight suit.) However, there was a fatal accident in which the board cited as a major contributing factor: "some degree of hypoxia brought on by the pilot's failure to use the aircraft's oxygen system."

To summarize briefly, on the return leg of a night towing mission, an F-8 collided with the ground while in the landing pattern. The board concluded that the cause was undetermined, the most probable cause being pilot error in that he failed to recognize his low altitude. During the investigation the flight leader reported that the pilot had been flying in the target area with his oxygen mask off. The cabin pressurization should have been 8000 ft at the altitude at which the flight was conducted. It was the flight leader's general impression that the pilot had his oxygen mask off at the break. The mask was found connected at the right fitting. It was also discovered during the investigation that the pilot was flying without his anti-G suit.

Compromises Rescue

Space does not permit a lengthy discussion of the various categories of misuse of required personal survival equipment shown in Figure 1. However, of particular interest are the instances in which delay in using or failure to use available equipment compromised the survival and/or rescue.

One of these was the tragic case of the loss of an uninjured pilot after a successful ejection. Observers saw his parachute deploy and watched him enter the water at what did not appear to them to be an excessive rate of descent. The helo was overhead in approximately 2 minutes.

From the air, the pilot appeared to be attempting to swim although he was still attached to his parachute. For flotation gear he had been wearing Air Force water wings (a modified LPU-2/P) snapped on at the sides of his torso harness and not fastened together in front. When the helo arrived one of his water wings was seen about 10 to 12 feet away, inflated and floating free. The other water wing was a foot or so behind his head and appeared to be attached but observers could not say if it was inflated. The pilot carried all recommended items of escape, personal and survival equipment, the accident report states, "plus more and some items in duplicate." His survival vest alone with attachments and extras weighed 13 lbs.

In spite of the helicopter second crewman's courageous attempts, he lacked the experience and training needed to save the pilot. When the pilot's parachute was finally cut loose and his seat pan was released, he was brought aboard the helicopter but it was too late.

The board considered that pilot factor contributed to the failure of the rescue. "There is no evidence," the accident report states, "that he did anything to help himself after a successful ejection in that both the parachute and seat pan were still attached." Because of the helicopter crewman's lack of experience and training in this case, the pilot lost his back-up chance at survival.

Opinions Solicited

Turning from statistics and records to opinion, we asked a number of persons for their comments on the subject of survival equipment, misuse of and failure to use.

An understandable trend in favor of survival equipment was reported by several pilots recently returned from WestPac. Pilots and crew overloading with survival equipment (as in the unsuccessful rescue attempt described above) is the trend carried to the extreme. *(See "You, Too, Can Be a 97 lb Heavyweight," APPROACH, January, 1967, p. 10. – Ed.)* One helicopter pilot, however, reported a tendency of helo crews to modify their flight suits by rolling up the sleeves or cutting them off in combat areas.

"I don't think there is much failure to wear/use survival equipment in the combat areas," a jet pilot recently returned from a combat tour said. "You might need it any old day. You wore what you were supposed

Figure 1: Misuse of required personal survival equipment, FY-68

Available, needed, not utilized	40
Lost; retention features not/improperly used	24
Discarded, needed	31
Inadvertent release/disconnect or inadvertent actuation	6
Unfamiliarity with actuation/release	8
Improper procedures/use of equipment	75
Restraints/attachments not utilized (or not utilized properly for maximum protection)	42
Delay in using or failure to use available equipment compromised survival and/or rescue	8
Nonstandard configuration	22
Total	*256*

Figure 2: Failure to wear or carry required personal survival equipment, FY-68

Required, not worn or carried for reasons not reported	143
Required, not worn or carried due to dissatisfaction with item or personal decision	129
Required, not worn or carried due to oversight	24
Required, not worn or carried due to supply problems	60
Total	*356*

These figures represent numbers of instances as noted from MOR reports for Fiscal Year 1968. More than one type of misuse/failure can be coded in each aircraft mishap. There were 307 aircraft mishaps in FY-68 wherein misuse/failure to wear or carry was coded.

to and in many cases, went to extremes."

A pilot with considerable recent transport experience in the combat area commented that he thought the situation was improving a bit.

"I think there's a change developing here," he stated. "The last part of my tour I wore my survival equipment faithfully and so did a lot of the junior pilots. We were becoming more aware of the fact that it can keep you alive. You have to be careful at this end of the scale, however, and not load yourself into the 'teddy bear configuration.' "

Recent Report

Two items from a recent report of an operational commander touching on the vital importance of personal survival equipment, properly worn and properly used in the combat zone, are worth considering here.

- A rescued bombardier/navigator suffered second-degree burns of his face, hands and forearms because he had taken his oxygen mask and gloves off and had his sleeves rolled up. The line between crew comfort and effectiveness is recognized, the spokesman states; however, the burns incurred in this incident seriously degraded the survivor's ability to evade and survive. The importance of buttoning up prior to entering a hostile environment should be stressed to all concerned. One lesson that has been learned repeatedly is that you never know when you are going to be zapped.

- Two successful SAR pickups involving aircrew of one Air Group, one a day rescue, the other at night, would in all probability not have been accomplished without a properly functioning survival radio. The personal survival radio, the report states, represents the single most valuable survival item carried by aircrewmen. Proper care and handling of these radios should be of the utmost concern to all aircrewmen. The loss of a survival radio by a downed crewman can mean the end of the ball game.

Stereotype

Early in our inquiries, the stereotype of a certain kind of pilot and aircrewman materialized: the breezy "kick the tire and light the fire" type who can't be bothered with details such as required survival equipment. There is no way to estimate how numerous this type is but everybody seems to have seen at least one! A helicopter pilot put it this way: "Some people try to be gungy. They don't wear survival equipment – they roll up their flight suit sleeves or they cut them off or they wear utilities instead of flight suits. These are the types who acknowledge the excellence of self and want the rest of the world to know too. Some of them have the idea that wearing flight gear and survival gear is not necessary in the combat area where, in fact, it is *most* necessary.

"This business of not complying with the logic of proper use of flight and survival equipment is difficult to understand. It is not only anti-self-discipline but for aircrewmembers and their superiors alike it is a life endangering form of old-fashioned 'selective disobedience' and clearly erodes the letter and spirit of basic operational military discipline."

"Not to Me, It Can't!"

In addition to the "can't be bothered" syndrome, the "it can't happen to me" attitude came up for comment. Medical and human factors personnel voiced their thoughts on this one:

Aviation psychologist, a former naval aviator: "People who take chances – and this is what people who don't wear their survival equipment are doing – people who take chances are denying their own mortality. This can be at the conscious level or it can be repressed, in which case the pilot or crewman 'forgets' to wear his survival equipment."

Physiologist: "The kind of man who gets into an aircraft to be shot at tends to be a man who thinks that he doesn't need any kind of safety protection. He tends to think he's indestructible. Age often changes this. As the young fighter pilot, for instance, becomes older and wiser, he becomes more aware of safety needs."

Nomex Gloves

AS AN example of how the Naval Safety Center can be of assistance in solving unit supply problems dealing with flight clothing the following is cited. Informal discussions with officers attending the December 1968 Aviation Safety Officer's Orientation Course, held at NAS Norfolk, disclosed the fact that many squadrons were unable to obtain nomex flight gloves through normal supply channels. The reason, frequently offered by flight gear issue pools, appeared to hinge on the fact that the old stock of grey simplex gloves must be exhausted first before issuing of nomex gloves could begin. If you add up the cost of all remaining obsolete flight gloves on all the shelves in the Navy the value would still be less than the cost of one pilot or aircrewman's hand. NavSafeCen initiated a request to AirSysCom to lift any issue restrictions placed on nomex gloves and AirSysCom took it from there. NavAirSysCom msg 092258Z Jan 69 states in part "Restrictions on issue of subject gloves lifted." Action was also initiated to delete the simplex glove from the Section H Allowance List.

Flight surgeon, a naval aviator and former test pilot: "A pilot flies day-in and day-out with his survival equipment. Then, perhaps, he becomes complacent with his environment, not realizing that at any moment he may need this equipment. He fails to refresh himself on the equipment and its uses. This is a kind of function of self-preservation – a denial of risk. Pilots and aircrewmen should realize that this psychological mechanism can be at work and they should force themselves to use the survival equipment and train in it. Squadron safety officers should also be alert to recognize this tendency."

Discomfort, Incompatibility

Most of the persons queried observed that pilots and aircrewmen who don't wear various specific items of their personal survival equipment often give discomfort or incompatibility as the reason. Frequently mentioned in this connection is the Mk-5A anti-exposure suit. (The suit itself does not show up in usage/misuse statistics in all probability because of squadron waivers.) Aircrew survival equipment men point out that some pilots and air crew wear winter flying suits under the Mk-5A instead of the prescribed insulation/ventilation liner and are, therefore, more uncomfortable. They also point out that readyrooms aboard the newer carriers have vent air to hook up to the suits. This eliminates wearer discomfort during the period before manning aircraft. (According to unofficial reports, vent air outlets aboard some ships have been capped.)

On the incompatibility score, a helo pilot mentioned the incompatibility of body armor and flotation gear. This problem has been addressed by Air Crew Systems Bulletin 179 which authorizes helicopter aircrewmen using the T-65 body armor to wear the LPP-1 passenger life preserver modified in accordance with Air Crew Systems Change 155.

"Generally speaking," the helo pilot went on to state, "survival equipment is a problem in the helo area. Helicopter survival equipment requirements are really substantially different from those of fixed wing aircraft. There's a world of difference between helo cockpits and the airconditioned environment of a jet pilot, for instance."

Supply Problems

Several persons mentioned the time lag between approval of a piece of survival equipment and availability in the fleet.

During FY-68 there were 60 instances of failure to wear or carry required personal survival equipment because of supply problems. Leading items were various signaling devices for a total of 19. Eleven of these were the Mk 79 Mod 0 pencil flare gun, a shortage which has since been relieved. Radios (10), gloves (9) and flight shoes (5) were the second, third and fourth most mentioned items not worn or carried because of supply problems. Items currently in short supply may not be reflected in these figures since the fiscal year covered ended 30 June 1968.

What Can Be Done?

So much for a general discussion of the problem of misuse of and failure to use personal survival equipment. What can be done about it? Here are some key points for consideration:

- *Supervision and leadership:* Supervision should be synonymous with leadership. Senior officers and squadron commanding officers and their staffs should wear the required gear and ensure that those under them do also. By their example they should support compliance with the requirements for wearing survival gear. The cynic who coined the phrase, "Don't do as I do, do as I say" was an astute observer of human nature. Actions speak louder than words.

Along the same line, plane commanders should see that their crews and passengers are properly outfitted and indoctrinated for flight and for possible inflight emergencies.

- *Professional attitude:* A professional attitude is the hallmark of a man who really knows he is good at his job, who has self-confidence. He doesn't have to impress the nuggets to bolster his own esteem. The professional can accept authority and survival equipment requirements because he *has* achieved maturity and established his own identity, because he *is* his own man.

- *Knowledge, training and practice:* Know your equipment and your emergency escape systems cold. Keep up with training requirements, make careful preflight checks of your equipment and perform frequent dry-runs of your escape procedures. And make sure everybody who flies with you is properly outfitted and checked out.

- *Keep the channels of communication open:* Sitting around griping in the readyroom won't get things changed. If you have valid problems let the people know who can do something about them. Document equipment failures on Special or Safety UR message reports in accordance with NavAirInsts 4730.5 and 4700.2 series, Chapter 15, and send suggestions to APSET (Aviation Personal Survival Equipment Team, Air 531, Naval Air Systems Command) which meets twice a year. Write letters and make phone calls. If you have supply problems, tell the people in charge.

- *Finally:* Proper use of required personal survival equipment can lessen the cost in human resources of naval aviation accidents. Remember, when the chips are down, it's going to be *your* survival emergency – yours alone – so be ready. ◄

Down in Mindoro

THE DAY you leave a piece of personal survival equipment behind can very well turn out to be the day you need it most. Take, for instance, the case of a carrier-launched F-8 pilot who ejected over the western edge of Mindoro in the Philippines. Before ejecting he squawked Mayday but did not think he was "putting out." SAR forces failed to locate the accident site. The pilot did not have a personal survival radio or SEEK kits. Twenty-six hours elapsed between ejection and arrival at the Sangley Point dispensary; his wounds subsequently became grossly infected, necessitating an estimated three weeks' hospitalization.

Parachute Descent

"The terrain below was flat and as I got nearer the ground, I could see some scattered trees, bushes and tall grass," he reports, describing his parachute descent. "I was headed for some bushes and tried to steer myself clear. I thought I was going to miss them but I had one more swing in my descent and landed in a bush which had saw-like stems. That stuff tore through my flesh like a razor blade. I got a severe laceration on my right hand and several smaller ones on both hands. I didn't have flight gloves on at the time. Gloves would have minimized the smaller lacerations but I don't think they would have helped the larger one. I also got a very severe laceration on the back of my right thigh but I didn't realize it right away.

"I immediately disentangled myself from the bush and stripped off my flight gear. *I did not have my SEEK kits on me – I didn't think I would need them that day.* My old kits were faulty and I was going to get new ones that morning but I forgot. The only thing I could do was cut up some parachute and wrap my wounds tightly. The bush tore through my skin so fast that I never felt myself being cut.

Natives Arrive

"Next I pulled out my survival radio from my seat pack and broadcast for about 10 minutes with no response. At this time four natives who had seen me descend in my parachute arrived to help. One of them could speak understandable English and told me I was on Mindoro. They gathered up all my stuff and we walked for about 10 minutes to their house. When we got there they gave me coffee and some rags to compress the wound on my hand. I noticed them pointing at the back of my right leg and talking; I looked and it was then that I saw the big gaping hole in my leg for the first time. That really scared me. All I could do was stuff it

and wrap it up good. *(Instead of using rags furnished locally, the pilot would have been better off using more parachute cloth or his undershirt, –Ed.)*

"My wounds were beginning to hurt and my left leg was badly bruised and was starting to get stiff. I must have also twisted my left ankle because it was beginning to swell. (All-in-all I had been in good shape until I hit the ground.)

"We then traveled to a small village by means of a sled drawn by a water buffalo. I took only my flight gear and left my seat pan and chute with the natives. We had to go a roundabout way because it started to rain heavily. The trip took about four hours, the last half-hour a boat trip across a river.

"When we got to the village, they fed me and gave me new rags for my wounds and some clothes. About an hour later we set out by jeep to see if we could make it to a large village where there was a telegraph. We traveled about two hours – slow going because of the rain and bumpy roads. We crossed two shallow rivers without too much trouble but the last river was about 5 ft deep so we had to turn back to the village we started from. I slept there that night.

"The next morning they fed me and we started out again for the large village by a different route. When we arrived, I wrote out a telegram for the Philippine constabulary to send to Cubi Point. Then they took me to the hospital.

"At the hospital they cleaned up and bandaged all my wounds and sutured the wound on my thigh because it was open too much. An Australian missionary I had met at constabulary headquarters made things easier because I finally had someone I could really talk to. He gave me some clothes and brought food to me at the hospital."

Admitted to Hospital

A Philippine Air Force plane took the pilot to Sangley Point where he was admitted to the base hospital. As stated before, his lacerations, initally treated with rag dressings and the leg laceration sutured with a drain left in place 20 hours after ejection subsequently became grossly infected. This necessitated a hospital stay estimated at the time of the investigating flight surgeon's report as 21 days.

"It is noted that this man had neither a personal radio nor SEEK 2 survival kits," the investigating flight surgeon observed in his report. "The radio in the seat pan, a PRC 63, was there quite unintentionally as these had been removed by the Detachment from their seat pans a short time before. The SEEK kits were standard equipment for the Detachment but were not carried on this occasion . . . The absence of flight gloves while parachuting into rough terrain was noted by the pilot himself as contributory to several of his hand injuries. The conclusions and recommendations are obvious."

Safety Center comment: Items in the medical packet of the SEEK 2 kit which would have been useful in this situation are the anti-infection (oxytetracyclin) tablets, antibacterial soap, gauze bandage, bandaids and antiseptic ointment for small cuts and aspirin for pain. Will you have your SEEK kits with you the next time *you* fly? ◄

notes from your flight surgeon

Ammonia Ampules

AFTER completing a bombing run and as the pilot initiated dive recovery, the F-4J pitched violently nose down pinning both crewmembers against the canopy. The pilot's hands were forced off the control stick. The nose of the aircraft then pitched up violently, pinning both crewmembers down and forward in their seats. Two more oscillations followed. The pilot pulled the stick aft during the second pitch up and held it aft through the third pitch down and recovery. Final recovery was at 700 ft. The front cockpit accelerometer indicated plus 7.7, minus 2.2 G following recovery. The incident report does not state whether or not anti-G suits were worn.

The pilot blacked out momentarily during the oscillations. After recovery and while in level flight at 10,000 ft, he engaged autopilot altitude hold and again became briefly unconscious. He regained consciousness at the urging of the RIO who instructed him to use his ammonia ampules. He later said he firmly believes the ammonia made continued flight and landing possible.

The squadron is carrying ammonia ampules in both cockpits. *(See "Letters to the Editor," APPROACH, September, 1967. – Ed.)* The cause of the violent oscillations is undetermined.

Protection

AS REPORTED by a Safety Council, an ordnance man dropped a 500 lb bomb on his foot. Because he was wearing safety shoes, the result was a fracture instead of a severe crush injury.

Flash Fire

ALTHOUGH JP-4 splashed into the open door of a UH-1E in a hot refueling accident and soaked the copilot's nomex flight suit, the suit did not ignite in the ensuing flash fire which engulfed the port side of the aircraft. The copilot had his sleeves rolled down, his helmet visor was down and he had on gloves. When flames blocked his exit through the open door he escaped via the crew chief's door in the crew compartment. He was not burned.

As the fourth endorser to the report summed it up, "This accident vividly illustrates the injury-limiting importance of the nomex flight clothing during a fire." It also emphasizes the benefits of visor down and gloves on.

Another Save

DURING rescue after a successful ejection, as winds gusted to 25 kts, the pilot oscillated and struck his head against the side of the helicopter. The shock of the impact was absorbed by his APH-5 helmet.

Save Face!

BOTH pilot and NFO of a KA-3B had their helmet visors down at ditching, the investigating flight surgeon reports. Neither man received any facial injury. The other two persons aboard had their helmet visors up. Both sustained what the flight surgeon describes as "significant lacerations" which came within 1/4-inch of their eyes.

Flight surgeon's recommendation: Keep your helmet visor down and save face!

Confidence Builder

PREVIOUS training was a one-day course in deep water survival at North Island. The course consisted of parachute entries, survival in the liferaft and helo pickup. I feel this course gave me the confidence and the ability needed when I found myself in a survival/rescue situation. Found in the same environment again, the only thing different that I would do would be to inflate the Mk-3C before entry into the water (as the F-4B NATOPS says to do if time permits). – *F-4B pilot after ejection.*

Punches Out

AFTER practicing high work at altitude, a student pilot in a T-28C descended into the traffic pattern at an outlying field for landing practice. After becoming airborne following his first touch-and-go landing, he suspected power loss and elected to abort the takeoff. As the aircraft ran off the end of the runway into the soft dirt of the over run, he pulled up the landing gear. The aircraft came to rest 285 ft from the end of the runway.

Believing the emergency open system of the canopy had failed, the student pilot broke the overhead canopy with his survival knife and exited the aircraft. Although it was found later that he had not activated the emergency open system of the canopy which was functioning properly, this escape serves to remind us that in certain aircraft it is still possible to make an emergency egress through the canopy by means of the survival knife. ◄

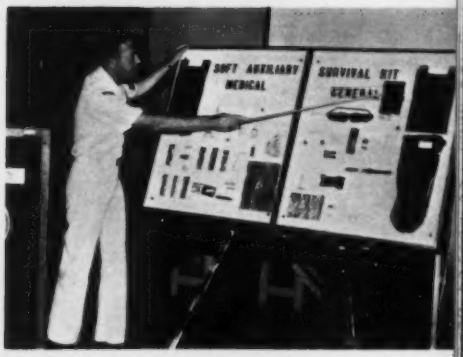
Road Show

DURING World War II, a Chinese seaman from a torpedoed British freighter survived alone aboard a life raft for 133 days. In 1966 a Navy pilot escaped from his captors and spent more than 3 weeks evading the enemy and traveling through the jungle to safety. Such survival experiences are the exception, not the rule, but it just goes to show that such events do happen. The key to survival is the will to survive and a major contributing factor is self-confidence – the kind of self-confidence which can be acquired through survival training.

One of the Navy's far-reaching efforts in this field is the FAETULant Mobile Survival Training Group. This team of five instructors annually carries an intensive two-day refresher course to every major naval and Coast Guard air station along the Atlantic seaboard from Brunswick to Key West and in alternate years to Roosevelt Roads and Keflavik. As required by ComNavAirLant Instruction 3740.11 series, pilots and flight crews in the Atlantic Fleet go through the course every 24 months. *(ComNavAirLant also has a winter survival school at NAS Brunswick which will be featured in a forthcoming issue. Survival training in ComNavAirPac is conducted by FAETUPac at NAS Whidbey Island, NAS North Island and NAS Cubi Point; the Cubi Point school was featured in "Shopping Center for Survival," September 1968 issue. – Ed.)*

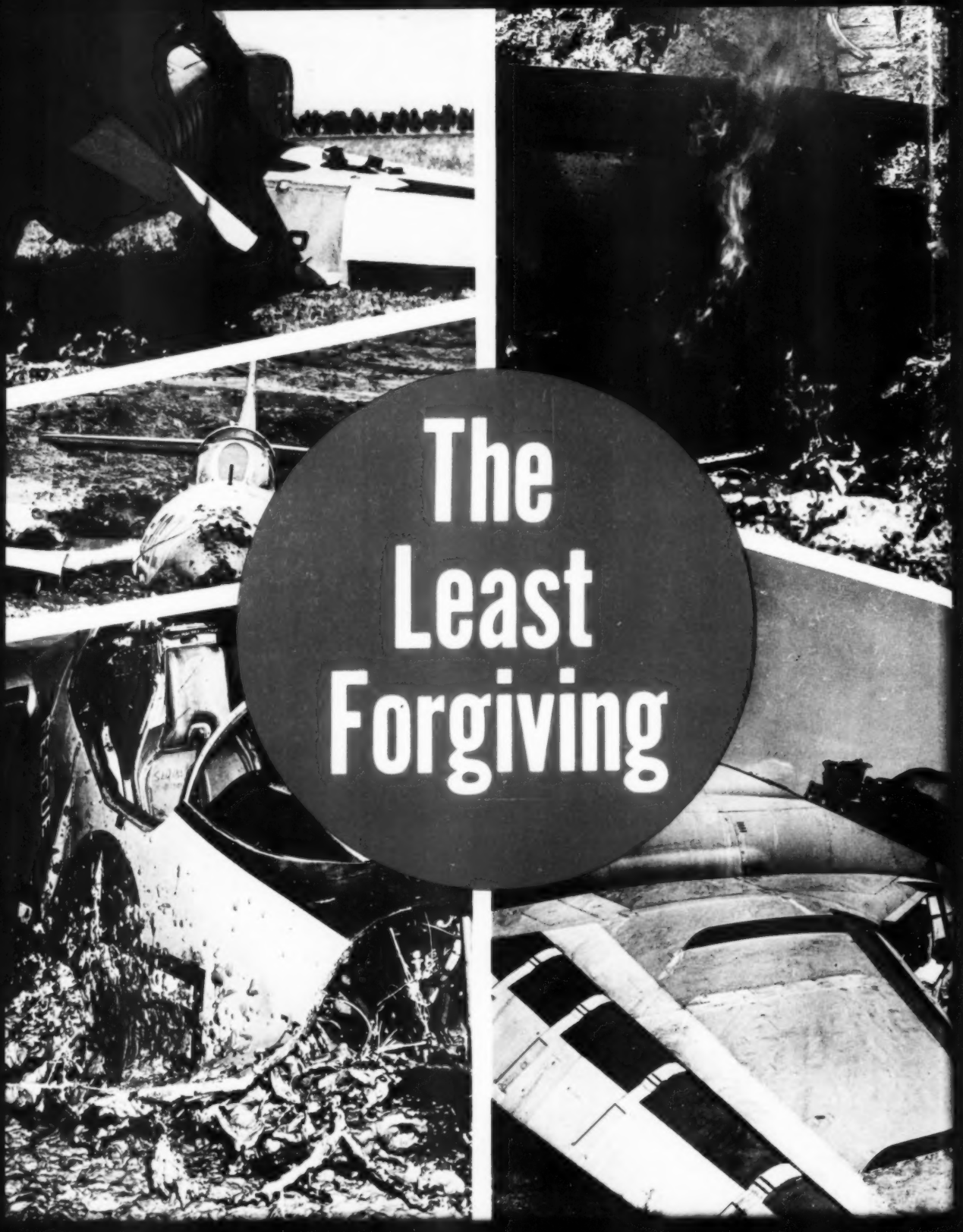
The FAETULant Mobile Training course encompasses a wide range of subjects. In the morning session of the first day are sea survival hazards; helicopter rescue and pick-up devices; Operation Sky Hook (Navy men may encounter this rig used by the Air Force for rescues); life preservers and related equipment; deep sea survival; and distress signals. The afternoon session covers life rafts and related equipment, life raft psychology and shark sense.

On the second day, students pick up the second half of sea survival hazards, including an Office of Naval Research movie, "Venomous Animals of the Sea." Then they go on to the new topics of survival fishing tips; survival medical self-help; "teddy-bear" configuration (a reference to personnel overloading themselves with survival equipment); cutting edges and improvised equipment; traps and snares; water procurement and preparation; survival plant food and insect life; and SEEK kits.



AirLant pilots and aircrewmen go through the refresher survival course every two years.

Student reaction to the course is enthusiastic. All the instructors are graduates of Navy Instructor School and have gone through various SERE courses and sea and land survival schools. More survival articles will appear in future issues of APPROACH. ◄


The
Least
Forgiving

Since the mishap rate is traditionally highest and accidents most severe among fighter, attack and helo aircraft, anything less than our very best maintenance effort in this area is unacceptable.

LIKE the doctor who calls one case of plague an emergency, we should so view any maintenance error involving this group of aircraft. All aircraft deserve the very best in maintenance but there are some so sophisticated that even the slightest maintenance goof can compound a pilot's problem to the point of disaster.

For example, an improperly installed main fuel pump filter bowl and V-clamp caused an inflight fire in an F-4. Pilot and RIO, in turn, were forced to eject. The aircraft was a strike. Here was an expensive loss caused by a simple, yet unnecessary error.

In another instance expensive damage to a *Phantom* was caused by inflight fire when fuel under pressure sprayed into the engine bay. The afterburner pressure and vent valve threads had been stripped due to overtorquing. Another intolerable maintenance error and mission failure.

Still another *Phantom* experienced a CSD failure due to low oil pressure 30 minutes after a catapult launch. The B-nut on the oil filter scavenger fitting had backed off allowing the loss of oil. The B-nut was undertorqued and left unsafetied. Although the *Phantom* made it back to base on its remaining good engine the mission was a failure.

Single-engine aircraft such as the A-4 are even less tolerant. For instance an A-4E had not been serviced with the proper amount of oil during transient service. On its next leg of the flight the engine seized forcing the pilot to eject.

Failure to correct a series of false fire warning discrepancies led to the destruction of a *Skyhawk* and fatal injury to the pilot. A fire warning occurred shortly after takeoff causing the pilot to become so preoccupied with the fire warning in a critical phase of the flight that he lost control of the aircraft. Investigation revealed no evidence of an inflight fire.

A 7/16-in. socket caused engine failure on the takeoff run beyond the abort position. The A-4 was a strike and the pilot received critical injuries. An unforgivable maintenance error in an unforgiving aircraft during a critical phase of flight.

Turning to the helicopters, an engine power failure in an H-34 shortly after liftoff from a ship resulted in a ditching and loss of the chopper. Cause of the engine failure – a disconnected magneto primary lead. A simple but soul-searching type of maintenance error.

A power loss on final caused a chopper to crash into the side of a hill. The throttle cable had failed from excessive wear. A maintenance error was allowed to progress to the inevitable.

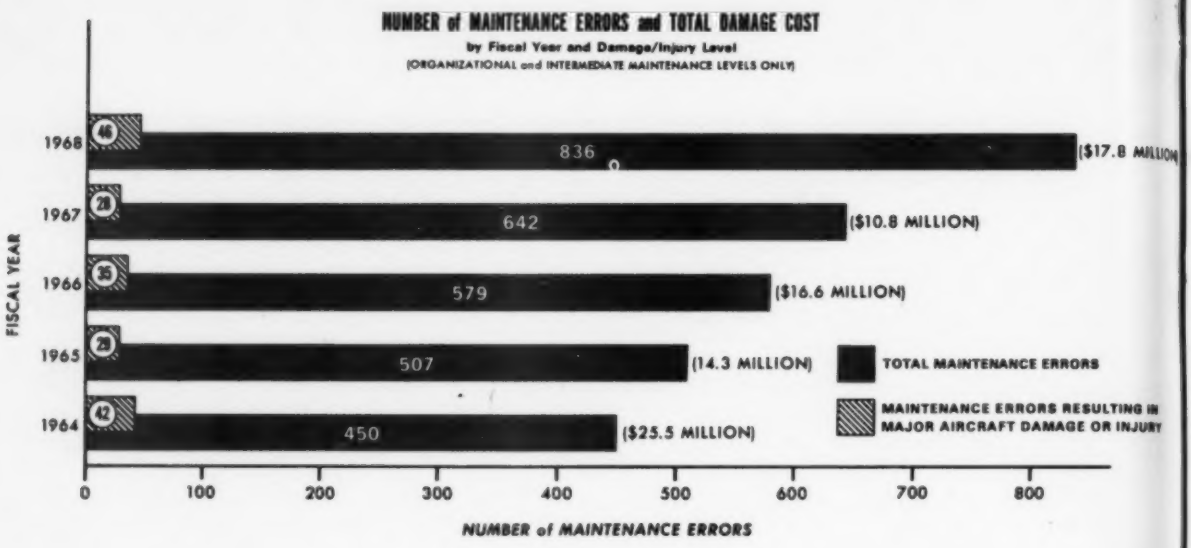
These examples from the records of the past year emphasize the need for beefing up our maintenance, supervision and quality assurance efforts in aircraft where errors result in the most severe consequences.

We are experiencing a totally unnecessary loss of assets, people and hardware through lack of hindsight. Hindsight in this sense includes application of effective practices developed to ensure nonrepetition of the same tragic accidents which we are experiencing today. How else can we explain the loss and damage to aircraft resulting from maintenance actions or maintenance inactions? This area should be the least of our problems and can hardly be classified as a result of something new and complex. The rules of proper practices are so well established that it causes us to wonder why they occur at all, much less increase in frequency.

Yet the number of maintenance errors during the past year resulted in 836 mishaps in the air and on the ground – an increase of 30 percent over the previous year.

Let's take a look at the spread of maintenance errors by type and the necessary corrective action. The largest number of errors (124) were made during the installation of components or parts. Use of the MIM and quality assurance inspections are the most effective means for the prevention of these errors.

The second most often repeated error (102) was improper or inadequate servicing of aircraft systems or



equipment. The errors included failure to properly reinstall fuel, hydraulic fluid and oil caps and plugs. Simple but critical inactions here are virtually inexcusable and happen all too frequently.

Torque errors (96) involving nuts, bolts and fittings were the third most repeated error. Training of the individual, as to the requirements of torquing to proper values and in the use of the proper tools, coupled with quality assurance are proven techniques in coping with this type problem.

The fourth most repeated error was failure to properly secure cowling, door, panel and hatch latches and fasteners. These simple haste-makes-waste practices resulted in many aborted flights and many hours to repair resulting damage. The corrective action here depends on individual integrity. One of the best rules to remember in eliminating this type of error is – all the way ON or all the way OFF.

Ordnance errors figured in 71 of the total number of errors. The most often repeated error involved failure to connect and to inspect the connections of electrical release harnesses from the parent racks of MERs, TERs and PBMRs. These errors resulted in the loss of racks with stores which would normally render the stores ineffective against their targets. Stated simply – *mission failure.*

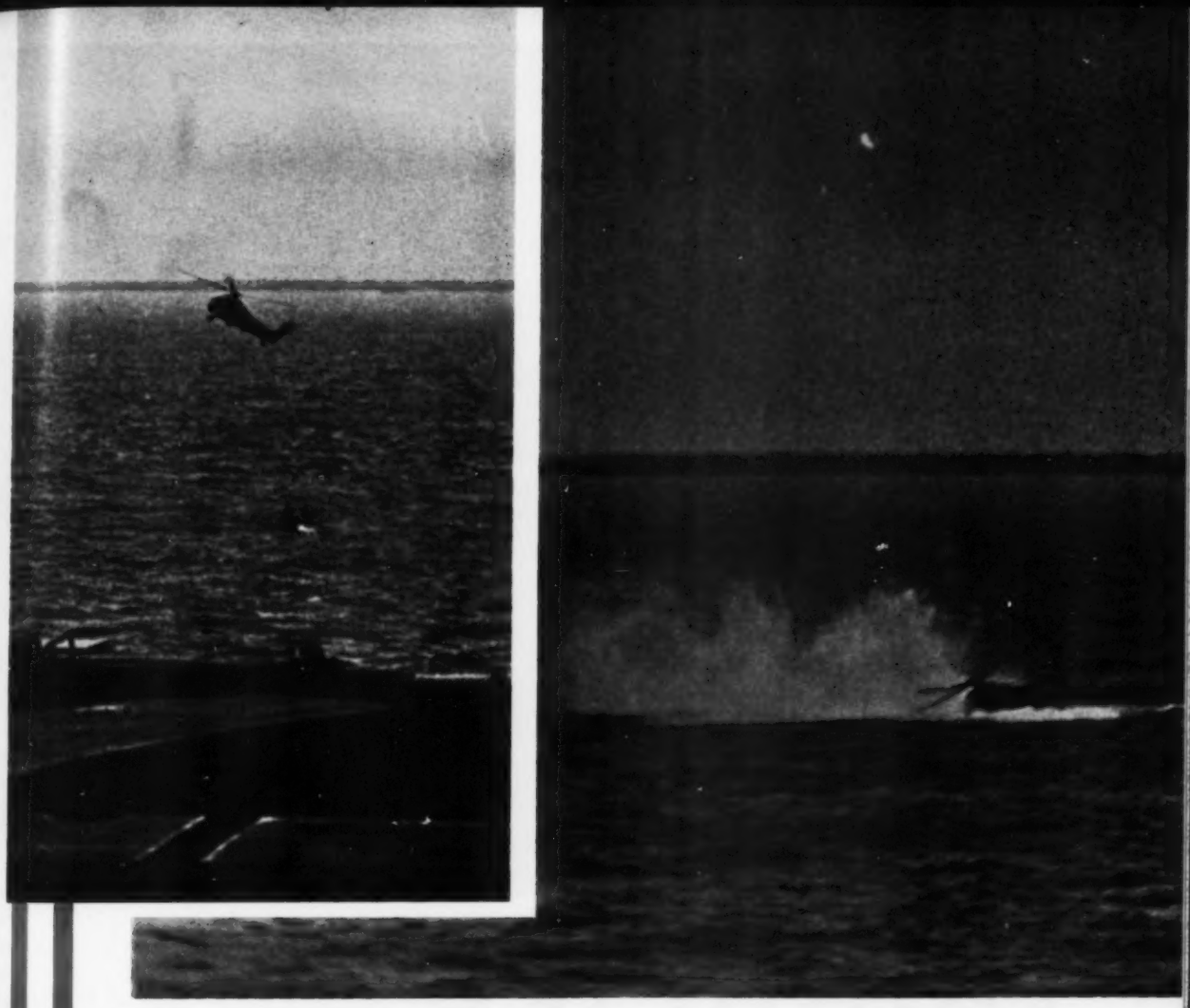
Another common error was the failure to make stray voltage checks and deviation from preloading and loading checklists. The seriousness of the errors indicates an urgent need to comply meticulously with the checklists.

The lack of supervision was a factor in nearly every one of the accidents. Since most of the errors were due to overlooking or neglecting ordinary maintenance practices, the solution to this problem should be obvious.

The following maintenance personnel factors were most evident in the 836 maintenance errors reported during Fiscal 68:

- *Lack of training, experience and familiarity with equipment.*
- *Failure to comply with maintenance instructions.*
- *Lack of attentiveness (complacency).*
- *Lack of effective quality assurance inspections including omission of functional checks.*
- *Inadequate supervision at all levels.*

In summary, practically all maintenance errors are preventable; therefore, it follows that all maintenance-caused mishaps are preventable. With proper effort directed toward eliminating maintenance error, particularly in those aircraft that are least forgiving, a giant step will have been taken toward guaranteeing mission accomplishment, conserving assets and preservation of life among our aircrews.



Mechs Mustn't Err

When a preacher makes a mistake, nobody knows it.

When a lawyer makes a mistake, he has a chance to try the case all over again.

When a judge makes a mistake, it becomes the law of the land.

When a carpenter makes a mistake, it's just what he expected.

When an architect makes a mistake, he plants shrubs and vines to hide it.

When a doctor makes a mistake, he buries it.

When a mechanic makes a mistake, trouble starts, a crash, an investigation, and finally the fault. It becomes an open wound with exposed nerve ends bringing painful howls even in response to application of healing medication.

CURRENT EVENTS

This article is based, in part, on the article, "Warning, Low Voltage," by MAJ Warren C. Hoflich, Jr., USAF, Directorate of Aerospace Safety and the article "That Light Bulb Can Kill," by LT M. H. Dixson, USN, Naval Safety Center. – Ed.

TOO OFTEN we think of electrical hazards as being associated with the higher voltages and infrequently concern ourselves with the hazards of 115 volts. Furthermore, inexperienced personnel may even fail to recognize aircraft systems as presenting the hazard of 115 volts.

A few years ago a typical aircraft had a 24-volt battery, a 28-volt generator and, except for the aircraft ignition system, a maintenance man was exposed to higher voltages only in the shop. Nowadays, most aircraft have generating systems producing 115 volts or greater. There are also many items of aircraft equipment which utilize this higher voltage and require much more power than in the past.

The complete trim button.

Hazards

Although 115 volts can kill directly – as will be discussed later – there is another threat connected with such voltages. It can easily cause incapacity or distraction which might also ultimately lead to severe injury or death. A recent aircraft incident illustrates this point:

An A-6A pilot was returning to home field on a GCA approach under actual instrument conditions. On final at about 500 ft, 135 kts, gear and flaps down, the pilot received a violent jolt of electrical current which prevented him from releasing the aircraft control stick for what "seemed like seconds." The pilot stated that he lost awareness of the situation and attributes this to a momentary lapse of consciousness. This is verified by the fact that the BN assumed control of the aircraft by reaching for the control stick and attempting to fly it straight and level. He was unsuccessful in this but he did manage to arrest the descent and when the pilot regained consciousness he found the aircraft was in a right wing down, nose up attitude. Attempting to remedy the situation by adding power and retrimming, the pilot was again subjected to a violent shock. At this time the pilot realized that the trim button on the control stick was missing. The ensuing recovery from the unusual attitude terminated with a missed approach to a successful GCA with a full stop landing. During the landing rollout, the pilot again received a violent shock but remained conscious.

Investigation revealed that the trim button on the control stick had come off in flight allowing the pilot to make contact with 115 volts, 400 cycle a.c. power.

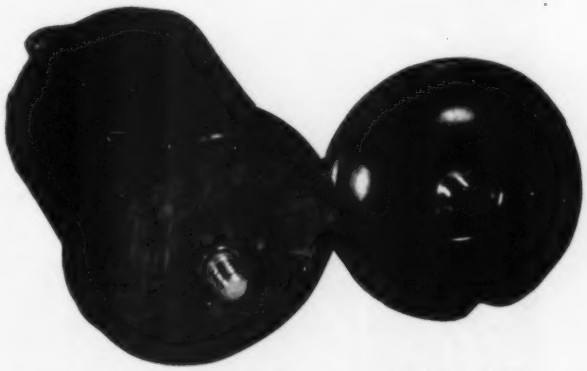
Disassembly of a trim switch revealed the rather startling fact that the stud that is exposed when the trim switch button is removed is "hot" at a 115-volt potential. This is because the center stud acts as the movable power source contact of the four-way trim switch. This switch is used almost universally in a variety of aircraft types. To further complicate the situation, it is probable that the pilot will be unaware of where the shock originated as he most likely won't feel anything until he grounds himself with the other hand in actuating some other switch or control. Therefore, it should be obvious that a cracked, broken or missing trim switch button should be a matter of urgent concern necessitating immediate replacement of the trim switch.

The trim button with outer cap removed.

Informal conversations with personnel at NavAirReworkFac NorVa indicates that up to 80 percent of A-6 aircraft processed have damaged trim switches which require replacement because of broken trim buttons.

The switches come in two varieties – one with a press-on type button and the other with a button which screws on. Both types of button are fixed to the center stud of the switch and secured in place with *Locktite.* When properly secured with *Locktite* trim buttons cannot be unscrewed or pulled off without breaking. In fact, if the button can be removed without breaking it is considered to have failed the quality assurance test.

Trim buttons will ordinarily break only under the



The trim button with cap removed exposing pilot to 115 volts, 400 cycle a.c. power.

impact of a sharp, hard blow. Therefore, in view of the large number of damaged trim buttons found on aircraft being processed through NavAirReworkFac NorVa, it indicates personnel in operating units may be subjecting them to unnecessarily rough treatment.

The A-6 trim switch failure already noted is a dramatic example of the dangers of 115 volts but it is by no means the most serious. Recently, accidents have been reported where men were killed by 115 volts. In one case an aircraft crewman was killed by 115 volts from an aircraft starting unit. In another case, a man on board ship was fatally injured as he tried to change a light bulb in an extension light. It should be noted that this task is normally not considered dangerous in a proper environment where the extension cord is disconnected. In this case, the man attempted to change the bulb with the cord plugged in; he was in a confined space and temperatures were 100-105° with a high relative humidity. An additional factor discovered during the investigation was that the extension cord was of an ungrounded and unapproved type.

How Electricity Kills

Current is the real killer in cases of contact with lower volatges; in fact, the current necessary to operate a 100 watt light bulb is 8 to 10 times the amount needed to kill a person. Many factors are involved but the controlling one is the relationship between the voltage one may be in contact with and the resistance of the circuit of which his body is a part. If the resistance is low, the voltage can also be low but still sufficient to cause death.

Many times the question is posed, "Just what is an electrical shock?" When a person's body becomes part of an electrical circuit through which current flows, he receives an electrical shock. This shock can have the effect of discomfort or when sufficient current flows, can cause involuntary contraction of the muscles, affect or stop the heart, stop breathing or cause burns.

The course of current flow through the body may be local such as hand to hand or it may go through the heart or brain. The shock also may come from contact between a live part and ground or between two live parts at different polarity or phase. The total current flow through the body depends on the voltage of the circuit contacted, the insulating qualities of the area surrounding the shock site, the resistance of the skin, and the area and pressure of contact with the live conductor. Wet clothing may furnish a lower resistance through the body and over its surface. Direct current is generally considered to carry less shock hazard for a given voltage than alternating current but since d.c. arcs are more persistent, they are more likely to cause severe burns.

In discussing human resistance to electrical current a good rule of thumb to remember is that dry skin will afford a value of 100,000 to 600,000 ohms of resistance. Internal body resistance works in the area of 400 to 600 ohms when the current flows from hand to foot and 100 ohms when it travels from ear to ear.

With the resistance figures of the body in mind, let us set up a situation where an individual makes contact with 120 volts such as in the case of the extension light. If, because of the perspiration and high humidity, the man had a skin plus internal resistance totalling 120 ohms we would have 1/10 amp or 100 milliamperes of electrical current running from the point of contact to

Electrical maintenance work on aircraft demands caution.

ground through the body. The extent of danger from this current is more aptly expressed by a look at the effects of various levels of current as shown below:

- 1 to 8 milliamperes of current causes a mild sensation of shock but the individual is able to let go.
- 8 to 15 milliamperes causes a painful shock but the individual can still let go.
- 15 to 20 milliamperes causes painful shock and muscular contractions with loss of muscle control which means the victim cannot release himself from the source of shock unless muscular contraction becomes so violent that it breaks him loose.
- 20 to 50 milliamperes cause painful shock, breathing becomes difficult in addition to the above noted effects.
- 100 to 200 milliamperes causes ventricular fibrillation (a heart condition that disrupts the rhythm of the beat) and results in death.
- 200 milliamperes and over cause severe burns and muscular contractions so intense that the chest muscles clamp the heart and stop it. This prevents ventricular fibrillation and if proper first aid is administered soon enough, the man may survive. It is accepted by the medical forces that fewer low voltage shock victims can be revived than those receiving 1000 volts or more.

One of the insidious hazards associated with low voltage and one that causes many injuries and deaths is the fright reaction or recoil when a body makes contact with a live circuit. People have fallen from ladders and other high locations or have bumped their heads and injured other parts of their bodies after reacting from low voltage shock. And in the case of personnel in aircraft, the dangers of distraction or momentary incapacitation are all too evident.

We cannot change the use of electrical equipment for it is necessary to perform our mission but we can seek to recognize the dangers and follow the proper procedures.

Electrical Precautions in Aircraft Maintenance

Every person who works near electrical equipment should exercise extreme care and be familiar with the hazards involved. Any circuit may be *hot;* it should never be assumed otherwise until a check has been made.

- Failure to deenergize circuits before performing maintenance operations is one of the most common causes of shock and fire – and, it often leads to injury and expensive equipment damage.
- Wiring or electrical equipment should never be removed from or installed on a *hot* circuit. This includes removal and installation of junction box covers or fuses, when power is on. Positive means should be taken to ensure that the circuit involved is deenergized.

If it is not possible to deenergize the entire airplane electrical system before performing maintenance on an electrical circuit, the circuit involved in the maintenance operation should be isolated by pulling the circuit breaker. If fuses are to be removed, power must be removed first. Every precaution should be taken to prevent accidental contact of control cables, tools, metal parts and fuel lines.

- If a fuse blows or a circuit breaker trips, the cause should be determined before replacing the fuse or resetting the breaker. If a wiring system has been modified, it should be checked against the wiring diagram and an operational check made before releasing the aircraft for service. Wiring errors can cause damage to equipment and injury to personnel.
- When soldering an electrical connection, use solder sparingly. An excess of solder, or solder inadvertently dropped in the wrong place, can short out a circuit.
- The a.c. power distribution panel should not be opened when the battery is on, when engines are running or with external power connected to the airplane.
- New or repaired equipment should be thoroughly bench-checked before installation on the airplane to guard against shorts. This is extremely important when radar or radio components are concerned. These components should be repaired and tested at locations away from the airplane.
- Electrical systems of ground power units should be kept in first-class condition. Servicing personnel should be kept especially alert when working with electric power cables used on motor generator units and tow trucks. A defective contactor or cable with its insulation worn or cut should not be used. It is a good point to never handle the cable when it is *hot* and to always push the button on the generator to OFF and wait for the indicator light to go out before disconnecting the cable from the airplane. Particular care should be used during wet weather.

First Aid

Before touching a victim of electrical shock, the circuit should be deenergized or the victim freed from the live conductor by the use of some suitable nonconductive object such as a dry wooden stick or pole.

Artificial resuscitation procedures appropriate to the victim's condition should be started immediately.

To enhance the safety of personnel exposed to electrical hazards, commands should arrange for training of personnel in the various methods of artificial resuscitation; however, it should be noted that instruction in external heart massage should be given only under the direct supervision of the medical department. ◄

MURPHY'S LAW *

Hook Point Murphy

'Man who has choice has troubles' – *Confucius*

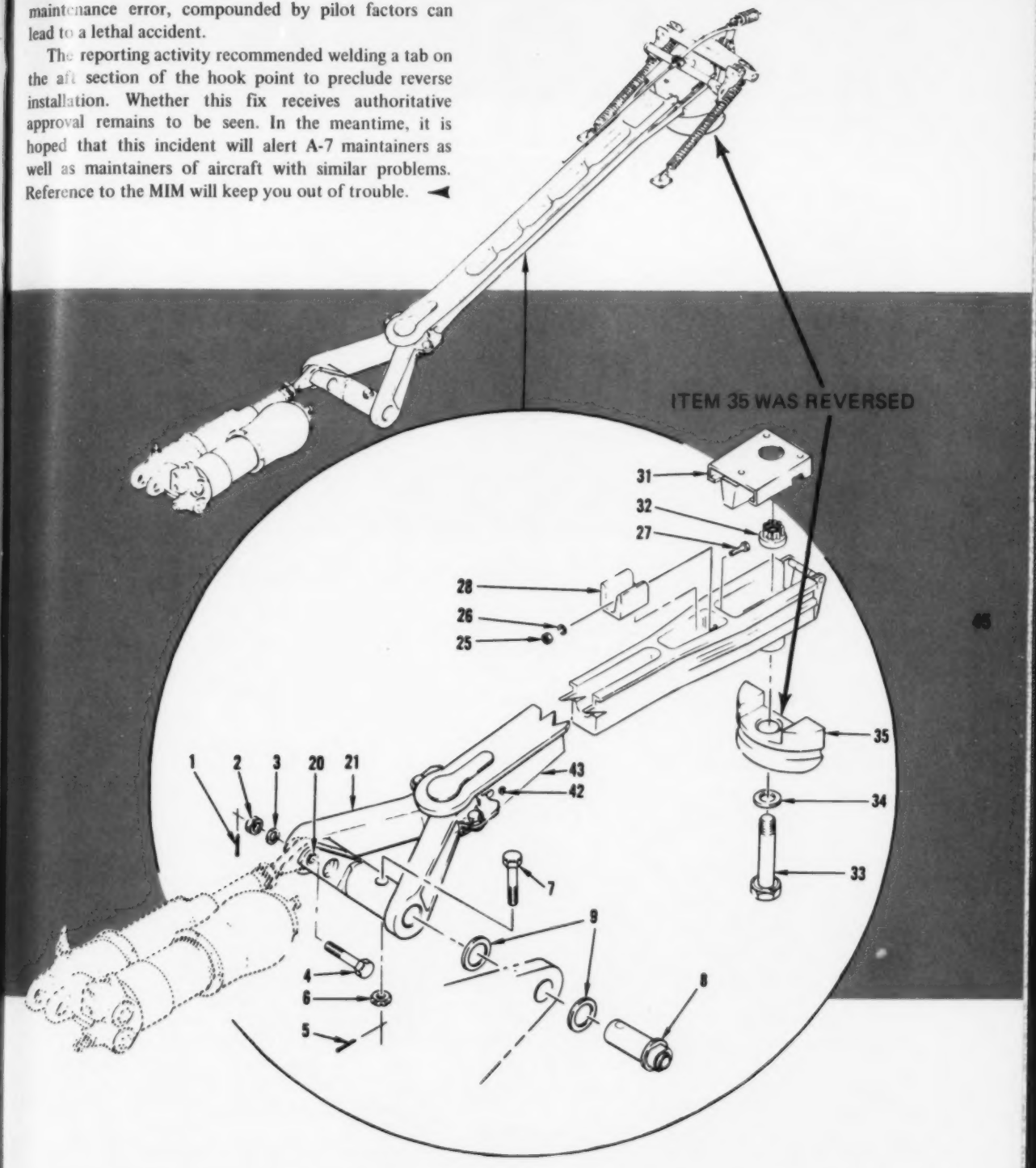
There was a time when a reversed hook was considered the in-thing, but for a 1969 A-7A this can present something of a problem.

AFTER four hook-skip bolters the A-7A was finally diverted to the beach. Investigation revealed that the hook point had been installed backwards (rotated 180 degrees). See illustration (item 35) for design detail.

Although this incident was caused by shoddy maintenance and inspection procedures, such a design suggests a second look by designers. This sort of goof was discovered years ago in the F-11F *Tiger.* Its recurrence seems to be a gross violation of the precept that once a design error is discovered it should never be permitted to reappear in a later design by any manufacturer. A design error of this type, coupled with

maintenance error, compounded by pilot factors can lead to a lethal accident.

The reporting activity recommended welding a tab on the aft section of the hook point to preclude reverse installation. Whether this fix receives authoritative approval remains to be seen. In the meantime, it is hoped that this incident will alert A-7 maintainers as well as maintainers of aircraft with similar problems. Reference to the MIM will keep you out of trouble. ◄



* If an aircraft part can be installed incorrectly, someone will install it that way!

LOSER

Watch TV? Sure you do. How about those ads, makes you wonder sometimes. Ever get the feeling that the reason for a special sale, prices slashed, one week only, now at a special price, is just another way of saying the stock is not moving? Usually, when you have a stock surplus in a business it makes sense to unload the stuff at a reduced price, put on a high pressure advertising campaign and clear the way for the new production run. After its all over and you've spent money you didn't have for a product you didn't need and you sit back and tell yourself what a savings it was, don't you really feel a little bit like the fellow who dials a number from the wall of a phone booth and his wife answers? A real loser.

What's a loser? A loser is a fellow who puts on his nomex flight suit and rolls up the sleeves. A loser is a fellow that puts on his Mk-5A poopy suit and snips off the ends of the sleeves so they don't bind his wrists. A loser is a fellow who forgets his survival vest, wears low cuts instead of flight boots, doesn't fly with his visor down and leaves his survival knife in his tackle box. A loser signs the yellow sheet without reading the last 10 gripes. He kicks the tire and lights the fire. He's your copilot whose gaze wanders on a GCA to minimums. He's the plane captain who preflights by memory instead of using the daily card. He's the fellow that approves the frag order for a CH-53 to go into an LZ that couldn't handle a Frisbee.

You often hear a loser utter such pearls as "no sweat" following a hook-up pass. He often refers to the way they "used to do it." His NATOPS manual looks brand new – and it's never been open past 1630. Finally, he's the fellow who will take the time to compute the time for the spray-back from the water fountain, to ruin the crease in his greens and will guess at the length of his takeoff run. Stangely enough, this fellow is a nice guy, one of the gang. Loves mother, apple pie and pro football. But, as they say in the Music Man, "he doesn't know the territory." And friend, this guy could be YOU.

You read APPROACH, "Mech," "Crossfeed" and glance at the "Weekly Summary" to see if we added up the accidents correctly. You look at the cost of one week's crunches and say to yourself, "If only I had that much green I'd . . ., etc., etc., etc." Then you put down the APPROACH or "Mech" or stick the "Crossfeed" back in the metal box on the swinging door and go back to the Acey Ducey Game in the readyroom.

Consider this. How much green does it cost to get a copy of APPROACH, "Mech," "Crossfeed" or the "Weekly Summary?" Assuming you're a naval aviator or aircrewman the cost is nothing, zero green! What's more, you don't have to wade through 60 pages of ads, letters to the editor, interviews, philosophy and forum to get to the center-fold. The action is right there on page one and it goes all the way to the end. It doesn't cost anything but a few minutes of your time.

Remember the examples of a real loser.

Remember, too, there's no real reason for you being a loser!

Letters

At this time of year the weatherman is apt to get rid of anything he has in stock.

Anon

Specific CHT Ranges for Cruise

NAS, Quonset, Pt. – The article "Cruising Cool" appearing in the November 1968 issue of APPROACH recommended adjustment of cowl flaps on R3350 engines to maintain cruise CHT as low as possible in order to improve engine reliability.

We feel that this general statement is misleading in that under frigid conditions and in certain installations where large engine cooling capacity exists, CHT far below those required for good cylinder head parts durability can be maintained.

To preclude the possibility of misunderstanding, more specific CHT limits appear to be in order.

VAW

• **Right you are! Since the publication of the article in APPROACH and in *Crossfeed (Part II, August 1968)* there have been numerous inquiries concerning the subject. The matter was referred to the Product Support Dept of Curtiss-Wright Corporation. The following is excerpted from their reply to set the record straight and to prevent any misunderstanding:**

During cruise the allowable CHT limit is 232°C, the maximum temperature being the engine specification limit. All engines will operate satisfactorily at the max CHT limit for a period of time. The max limit is a requirement before the engine can be approved for service use. However, service experience, over a long period of time as well as experimental test experience, has indicated that for increased time between overhauls, temperatures lower than the specification are required to alleviate troubles such as exhaust valve burning and breakage, loosening of exhaust guides, valve guide boss erosion and other cylinder head combustion chamber discrepancies. For this reason it is strongly recommended, where possible within the limitations of the aircraft load and speed conditions, that the *cowl flaps be adjusted to maintain cruise CHT at desired minimum of 180°C.*

For the record, it might be a good idea to record these temperatures in your file copies of the aforementioned publications.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Earthbound

Washington D.C. – Hurrah Schirra on all accounts, except the non NATOPS foot gear he wore apparently as a crewmember of the COD following his recovery on ESSEX. Tsk Tsk.

CAPT J. GALLAGHER

• **Hurrah hurrah for Wally Schirra.**
He circled the globe while we stood in awe.
Around and around the world he flew,
Resplendent in space suit and tennis shoe.

For those who know not the wonders of space,
We're forced to cling to this old place.
To wear the cloth of the nomex suit,
And lace the thing called a NATOPS boot.

Vol. 14 **approach** No. 9

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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Next Month

APPROACH takes a look at the problems of take-off aborts.

CREDITS **Cover Painting** by Robert Tourt depicts the RA-5C off on another recon mission. Courtesy North American Rockwell, Columbus, Ohio. **Pg 10** Photos by PH2 Steve Mack. **Pg 13** Photo by Art Schoeni, Courtesy LTV. **Pg 14** Lower left and upper right photos courtesy Kaman Aircraft Corp. **Pg 38** Chart by DM2 Frank Royce. **Pg 40** Photo courtesy Grumman Aircraft. **Pg 44** Photo courtesy collection of CDR C. A. Brown.

FALL STREET REPORT

How Now, Jones Averages

A BEARISH market since the beginning of the year has sent stocks in the naval aviation accident prevention program to a new low. Mishaps attributable primarily to pilot factors and maintenance errors have forced the accident rate to new highs, with corresponding losses in assets amounting to multimillions of dollars.

Board Directors are taking a new look at the back-in-the-saddle program designed to offset post-holiday recessions. Meanwhile C.O.s and Maintenance Managers and other shareholders are requested to review their portfolios to minimize, if not eliminate loss-leaders.

Perennially progressive blue chips are quoted for those seeking guaranteed gains.

Utilities	*Industrials*
Weekly Summary	Supervision
Flight Surgeon's Nsltr	Training
Crossfeed	Quality Assurance
MECH	3-M System
APPROACH	NavAir 4700.2
MIMs	FOD Prevention
NATOPS	Tool Control
FLIP Charts	Crunch Prevention
NOTAMs	ASE Maintenance
Posters	UR Reporting

Safety stocks do not thrive on the unpredictable or on conditions beyond one's control. They are supported by sound judgment and Standard Operating Procedures. We believe that profits realized in safety stocks will improve in 1969 by investing in the blue chips of aviation safety. But the operator would be well advised to exercise caution, and where possible, clairvoyance.

MERIT, FLYNCH, WINNER & SMITH, Brokers.